Bayfield County
Aquatic Invasive Species
Strategic Plan

"Never doubt that a small group of thoughtful committed citizens can change the world. Indeed, it is the only thing that ever has."

-Margaret Mead

Acknowledgements

Current Bayfield County Aquatic Invasive Species (AIS) Committee

County Supervisors:
Jeremy Oswald, Washburn
William Bussey, Bayfield

Red Cliff Band of Lake Superior Chippewa:
Mike Defoe, Assistant Fisheries Biologist, Red Cliff Treaty Natural Resources Division

Town Board:
Jim Krueger, Supervisor, Town of Namakagon

Lake Organizations:
Sally Pease, Friends of the Eau Claire Lakes Area, Barnes
Nan Olson, Long Lake Property Owners Association and former Board Director of Bayfield County Lakes Forum (BCLF), Iron River

Lake-Related Business Representative:
Sarah Boles, Northern Native Plantscapes, Cable

Past Bayfield County Aquatic Invasive Species (AIS) Committee

County Supervisors:
Kenneth "Bucky" Jardine, Port Wing
Dennis Pocernich, Barksdale
Jim Crandall, Drummond
Dee Kittleson, Washburn

Red Cliff Band of Lake Superior Chippewa:
Matthew J. Symbal, Fish & Wildlife Biologist, Red Cliff Natural Resources Dept.

Town Board:
Tom Thornton, Supervisor, Town of Grand View

Lake Organizations:
John Kudlas, Eau Claire Lakes Property Owners Association, Inc./Friends of the Eau Claire Lakes Area, Barnes

Lake-Related Business:
Cy Zaeske, King Realty, Cable

Advisors to Committee

Andrew Teal, Bayfield County AIS Project Coordinator
Tim Kane, Bayfield County UWEX Community Resource Development Agent
Mary Motiff, Bayfield County Tourism and Recreation Department Director
Pamela Toshner, Wisconsin Department of Natural Resources, Lake Management Coordinator, Northern Region-West
Miles Falck, Great Lakes Indian Fish and Wildlife Commission, Wildlife Biologist
Mark Abeles-Allison, Bayfield County Administrator

Funding Provided by:

Wisconsin Department of Natural Resources
AIS Control Grant # AEPP-022-06
and Bayfield County

Photographs on front cover and within text: Jan Esposi

Resolution

Table of Contents

Introduction

Eurasian water milfoil, zebra mussels and sea lampreys are three widely recognized nonnative aquatic invaders. These and many more Aquatic Invasive Species (AIS) have demonstrated the ability to choke our lakes and decimate fish populations.

The Wisconsin State Legislature Administrative Code NR 40.02 (3m) defines aquatic invasive species as the following:

> *"'Aquatic invasive species' means any invasive species that dwells in water or in wetlands."*

AIS have potential far-reaching negative impacts on recreational and economic resources of Bayfield County. At least two decades ago, the County understood AIS to be an adversary that needed serious attention. Individuals in the county, many from lake associations, have engaged in various activities addressing local AIS issues for years. However, AIS is not just a local problem. The mechanism for them to transfer from one water body to another is people and their activities. Addressing AIS on a local scale is necessary and important, and county, state and even national scale needs to address them, too. This plan focuses on the county level and the state will support it.

Legislative Action

In 2001, Wisconsin Governor McCallum created a Task Force on Invasive Species to evaluate and study the spread of invasive species in Wisconsin, to develop a statewide control plan, and to seek federal funding. Amendments in 2003 (Act 33) increased the lake protection grant appropriation (motorboat fuel tax) by $500,000 each fiscal year for the sole purpose of addressing aquatic invasive species via cost-share grants to units of local government and others. In 2005, NR198 – Aquatic Invasive Species Control Grants was created establishing procedures to award these cost-share grants. In 2009, NR 40 passed the Legislature, which is still one of the most comprehensive invasive species laws in the country.

In Wisconsin, the waters of the state are held in Public Trust. Article 9, Section 1 of the Wisconsin Constitutions states:

> *"The state shall have concurrent jurisdiction on all rivers and lakes . . . shall be common highways and forever free, as well to the inhabitants of the state as to the citizens of the United States, without any tax, impost or duty therefor."*

These words created a trust for which the state protects all waters for the public. Additionally, the legislature has given the Department of Natural Resources (DNR) authority to promulgate rules detailing necessary activities needed for the protection of this public trust—or public interest—in the waters of the state. NR 198 is a reflection of this authority and a purposeful action by the legislature and governor to provide additional funds to non-Departmental partners (like municipalities and lake associations) to address AIS issues locally.

Local Efforts

In Bayfield County, lake associations were (and continue to be) very busy in obtaining AIS state funds. Namakagon Lake Association, Inc. received a water quality grant in October 1997, a grant surveying for Eurasian water milfoil in April 2002, and an AIS education and prevention grant in April 2003. Cable Lake Association received a lake study grant in

October 2003, Lake Owen Association, Inc. in April 2004, and the Town of Barnes for the Eau Claire Lakes in April 2004. The Ashland Bayfield Douglas Iron Counties Land Conservation Department (ABDI-LCD) received a grant in May 2004 to host an AIS Educational Conference, held in April 2005, to increase knowledge of AIS issues in businesses and individuals in the region. Also in 2005, Iron River Area Lakes Association, Long Lake Property Owners Association, Property Owners Association, Inc. of Barnes/Friends of the Eau Claire Lakes Area, Cable Lake Association, Lake Tahkodah District, Delta Area Lakes Association and Namakagon Lake Association, Inc. were all involved with AIS Control Grants. All of them, along with the Lake Owen Association, are also involved with Clean Boats Clean Waters. 2005 was also significant in that the grassroots effort increased to include local governments. The Towns of Barnes, Cable, Delta, Iron River, and Namakagon were now active in AIS activities. The impetus for these on-the-ground efforts was often a group of concerned individuals who rallied the lake associations' interest. In turn, these associations rallied the towns' involvement. Individuals and lake associations continue to be leaders and activists addressing AIS concerns. They are not the only people though. Working in cooperation with the Lake Owen Association, Northland College and These individuals also initiated the process to apply for funding for a Bayfield County AIS Project Coordinator.

Bayfield County

On 31 May 2005, the Bayfield County Board passed Resolution No. 2005-019: Establishing an Exotic Aquatic Invasive Species (AIS) Ad Hoc Committee. Initially the intent of this committee was to: ". . . establish an Ad Hoc Aquatic Invasive Species (AIS) Committee, which will meet regularly over the next 16 months to provide direction and input on the control of exotic aquatic invasive species in Bayfield County bodies of water." In practicality, the committee met to learn about and support the request to the county from the Iron River Area Lakes Association. The committee requested that the county apply for and sponsor a WDNR Rapid Response Grant to treat the Eurasian water milfoil found in Twin Bear Lake in the summer of 2004. This action was completed; however, the committee did not meet regularly after that.

The County Conservationist submitted a WDNR AIS Control Grant by 1 Feb 2006 to secure an individual to 'provide direction and input on the control of AIS in the county'. The DNR awarded this grant to Bayfield County, and the county hired an AIS Project Coordinator in August 2006.

The main goals of the DNR AIS Control Grant (AEPP-022-06) were to:

1. Create and enhance a network to support and streamline AIS prevention and control efforts in coastal and inland watersheds.
2. Document invasive species locations and zones of influence over time.
3. Prevent further spread of AIS through education.
4. Obtain and manage funding to provide support for evolving water quality issues.

Under goal #1, the main objective was to create a countywide strategic plan for addressing AIS issues into the future. In recognition of a need for long-term oversight of such a plan, the Bayfield County Board of Supervisors passed a resolution and an amendatory ordinance (Appendix A) to create a standing county AIS Committee. The County Board initially charged this committee with providing input into the development of a county AIS strategic plan. Using knowledge gained from the past actions of individuals and towns, the committee has made a concerted effort to create a realistic and workable county plan.

Bayfield County and Its Water Resources

Bayfield County is the northernmost and second largest county in Wisconsin covering 1,476.3 square miles (also recorded as 945,832 acres in the *2015-2016 Wisconsin Blue Book*). Millennia of glacial action and weathering have sculpted the topography. Glacial deposits throughout the county cover the bedrock. The county's northern boundary spans approximately 86 miles of Lake Superior's coastline. This includes many unique coastal estuaries and other natural features. The soils in this coastal area, finely textured and poorly draining red clay, are geologically young and highly erodible. This is evident in Lake Superior after a hard rain. Erosion carries both nutrients that enrich surface waters and sediment that changes the topography of lakebeds. Both are consequences that may aid populations of invasive species.

The Red Cliff Band of Lake Superior Chippewa Indians (Red Cliff or Tribe) is a federally recognized Indian Tribe established June 1, 1936 upon meeting the criteria of the Indian Reorganization Act of 1934. The Tribe has made their home on the southern shores of Gitchi Gami (Lake Superior) at the coastal tip of the Bayfield Peninsula in northern Wisconsin. The Red Cliff Reservation spans 14,093 acres with 22.3 miles of Lake Superior shoreline.

There are a total of 2,888 acres of wetlands associated with the watersheds of the Red Cliff Reservation. Two wetland complexes (Raspberry River and Sand River) are especially unique in that they contain unique coastal fen, coastal bog, northern sedge meadow, lagoon, and dry pine forest (credit to Mike Defoe).

A large portion of the county's geographic land area drains into Lake Superior (Lake Superior Basin, Fig. 1). The remaining land base drains into the Mississippi River (Mississippi River Basin) via the Upper St. Croix, Eau Claire, Upper Namakagon, and Totagatic Rivers (St. Croix River Basin). The extreme southeast corner of the county is part of the headwaters of the Upper Chippewa River Basin (Fig. 2). The Great Divide, or Lake Superior Divide, is the name of division between the two major basins (Fig. 3), itself a remnant of the glacial period.

The knowledge of the water basins and their tributaries and water bodies is important in understanding the transfer of aquatic invasive species. Transfer of AIS to another water body occurs one of two ways: 1) through human assistance or 2) traveling on their own. If the water body is contained, like an inland lake, the introduction of AIS in most situations is via human action. (Note: waterfowl have also been implicated but it is difficult to assess this impact and very difficult to control). If the invasive species is in flowing water, as in a chain of lakes and/or via some type of drainage, it could simply transfer with the movement of water. This latter situation greatly increases the need for management efforts and vigilance.

Approximately 49% of the county's land area (467,049 acres) is in public ownership. U.S. Forest Service (272,832 acres), Apostle Islands National Lakeshore (6,082 acres), Wisconsin DNR (29,044 acres), and Bayfield County Forest (over 167,500 acres) lands make up the majority of that ownership (*2015-2016 Wisconsin Blue Book; Bayfield County Plat Book & Land Atlas 2013-2014; and Wisconsin Department of Natural Resources, departmental data, April 2014*). In addition, towns have some acreage, as well as the Red Cliff Band of Lake Superior Chippewa whose lands are located in the northeastern most part of the county. Notable larger tracts of public lands are the Chequamegon-Nicolet National Forest (which includes the Moquah Barrens Wildlife Management Area, and the Rainbow

Lake and Porcupine Lake Wilderness Areas), Bibon Swamp State Wildlife Area, Totagatic River State Wildlife Management Area, and four of the Apostle Islands.

Bayfield County has 962 inland lakes, the fourth highest number of lakes by county in Wisconsin. Vilas County (1,318 lakes), Oneida County (1,129 lakes) and Washburn County (964 lakes) have more. Although the number of lakes is high, their 22,629 surface acres make up only 2% of the county's acreage. In relative terms, Vilas County's lake acreage is 17% of the county and Oneida County's is 10%. From these figures, one can deduce that most of Bayfield County's lakes are small; in fact, 672 lakes are less than 10 acres in size. Only 41 lakes and impoundments are over 100 acres and these comprise over half of the total lake surface acreage. Only 352 of the 962 inland lakes have names, and they alone comprise 21,776 acres, or 96%, of the county's lake surface water. Table 1 summarizes the number of named lakes and their acreage per town.

Although the majority of the lakes are small, the sheer number of them affords many opportunities for people to own lakefront property. Tourism, recreation, and lakeshore property values are extremely important revenue-generating assets for the county. However, they are not without their conflicts. Nearly fifty years ago, the DNR stated:

> ". . . the number of uses to which surface waters are subjected is steadily increasing and often competitive."
>
> *[From the Introduction of "Surface Water Resources of Bayfield County," Department of Natural Resources, Madison, Wisconsin, 1970.]*

Aquatic invasive species compromise water quality and recreational use, increasing conflicts of use.

The majority of Bayfield County's water resources lie in the great number of rivers, streams and wetlands. Figure 3 shows the tremendous riparian resources of the county, many of which have the state Outstanding Resource Water (ORW) or Exceptional Resource Water (ERW) designation. (See Appendix B for a list of these waters.) The rivers, streams and wetlands make up 1,215 square miles of the 1,250 square miles of all surface water of the county (the small remainder in lakes). In addition to the ORW and ERW, many wetlands in the Lake Superior Basin have environmental significance (Table 2). Inland lakes tend to get all the attention with AIS; however, riparian and wetland habitats are equally threatened.

Safeguarding and responsible use of water resources are vital to the economic health of the county. In Bayfield County, the economics and the environment are tightly interwoven and interdependent. Maintaining high water quality and preserving the natural quality of the water resources are essential for sustaining the present tax base of towns and the county. Because of the abundance of public lands, there is less tax base to draw from; however, high quality public lands typically increase the value of adjacent or nearby private lands. Another matter with public lands is the cost of their management and oversight. Federal, state and county appropriations for the funding of these tasks have tended to decrease throughout the years and have posed a large challenge for 1) the management of and 2) the oversight of use of these lands.

Specific to AIS issues, another challenge is with the large number of small lakes in the county, each with unique fisheries. This feature increases the practice of anglers to move from lake to lake, often in a single day, which increases the likelihood of transferring AIS unknowingly. An unnoticed introduced species in a little-used water body can establish a foothold and can then serve as a source population.

A final challenge with addressing AIS issues and maintaining high-quality natural resources concerns the unequal distribution of public lands and inland lakes across the county. Most of Bayfield County's 25 towns with a few towns consisting mostly of public land shows the unequal distribution of public land here (Table 3.). This is significant in how much or how little tax revenue comes from the land within the towns' boundaries, and potentially, how much (or little) the public land and water resources are actively monitored.

The Towns of Barnes, Delta, Drummond, Grand View, Hughes, Iron River, and Namakagon have large amounts of public lands and lakes. Since the public management entity may have fewer funds to oversee these lands, oversight tends to fall upon the residents of those towns. Many residents address AIS issues of their own volition, and they do not ignore species in their neighborhoods that present an ecological threat.

Aquatic Invasive Species and Bayfield County

Aquatic invasive species are detrimental to ecosystems because they compete with native species for resources, change predator-prey relationships, physically alter habitats, and some prey directly on native species. Through millennia, and through the ebbs and flows of any one particular species, all the species in a particular ecosystem establish a stability of existence. If a new species comes into this system and does not have any population-limiting factors, such as a predator, competitor, pathogen, or disease, that species will have an advantage over the existing (native) species. The population of the introduced species could explode and amass available resources for itself, crowding out and diminishing native species' populations.

Additionally, the particular life strategy of an introduced species may give it some ecological advantage over other species. It might have a high reproductive output, high reproductive rate, high and/or seasonally earlier growth (or development) rate, and a genetic tolerance to live in various environmental conditions. For example, these genetic-based factors are what give Eurasian water milfoil (EWM) the greatest advantage over the native milfoils. EWM grows incredibly fast and in a wide array of water systems, starts sooner in the season, and reproduces vegetatively. The fragmentation of EWM results in many potential new plants, each one capable of rooting and starting a new population.

Human disturbance directly adds to the advantages an AIS has over native species. The human actions of removing shoreline vegetation and/or removing native plants from the lakebed open up areas for an invasive species to exploit. The development of shoreline habitats will increase storm water runoff, sedimentation, and fertilization. These consequences amplify the AIS advantage over native species.

Presently, over 180 species of non-native plants, animals, and other organisms exist in Lake Superior. Only about 15% of them are invasive in the technical sense. Some non-natives can persist without becoming invasive simply living among native species almost unnoticed. The concern is with those non-natives who populate greatly and take many of the resources from the natives. Boaters moving from the coastal waters of the Great Lakes to inland lakes, rivers and wetlands increase the risk of transferring aquatic invasive species.

The following are currently aquatic invasive species of greatest concern to the Wisconsin Department of Natural Resources, and equally to Bayfield County. Knowledge of their life histories improves the likelihood of their prevention and management.

The tables in Appendix E list: Known AIS by Lake in Bayfield County - 2015, AIS Found in Regions Closest to Bayfield County, and Other Exotics in Bayfield County or in Region.

Bayfield County's Planning Process

History of County Involvement

Individuals, lake associations and some towns have been intimately involved with AIS issues for the last few years addressing mostly prevention but also management options. In June 2005, the Pike Chain of Lakes Association asked the Bayfield County Board to sponsor a WDNR AIS Rapid Response Grant for the chemical treatment of Twin Bear Lake. The county's participation increased with the sponsorship of another WDNR AIS Control Grant, awarded to the county in April 2006, to hire an AIS Project Coordinator to address AIS issues countywide. A primary goal of this grant is to create a countywide aquatic invasive species strategic plan.

Individuals from various groups and agencies within the county felt it would be advantageous for the county, and the implementation of the future strategic plan to create a standing county AIS Committee. As the threat of AIS will never go away, and because of its possible negative effects to county revenues, addressing AIS issues should remain a high priority for the county. On March 29, 2007, the Bayfield County Board of Supervisors passed a Resolution (No. 2007-09) and an accompanying Amendatory Ordinance (No. 2007-10) to establish a Bayfield County AIS Committee (Appendix A). One of the duties of the committee is to "Provide input into the development of a Bayfield County Aquatic Invasive Species Strategic Plan, and review, recommend adoption, and help oversee the implementation of the Plan and future revisions to the Plan."

Creation of the Plan

The first of many meetings of the Bayfield County AIS Committee, which were open to the public, was in June 2007. The committee consists of two County Board Supervisors, a representative from Red Cliff Band of Lake Superior Chippewa, two lake association members, one lake-related business member, and one Town Board Supervisor. Additionally, advisors from WDNR, Great Lakes Indian Fish and Wildlife Commission (GLIFWC), Bayfield County University of Wisconsin Extension, and Bayfield County Tourism and Recreation Department often attended the meetings. They met monthly through January 2008, when the committee approved the final draft of the strategic plan. In early February 2008, county departments, federal and state agencies, Red Cliff Band, towns, cities, village, lake associations, business interests, and interested citizens received the plan for review. The county held two public informational meetings on the proposed plan in late February 2008. The committee used public comments were to revise the plan and then held a public hearing on April 15, 2008. The Bayfield County Board of Supervisors adopted the plan for immediate implementation across the county.

The citizens and public officials of Bayfield County want to be proactive in responding to the potential problems AIS causes countywide. It is the Bayfield County AIS Committee's hope that this Strategic Plan will address comprehensively and completely all of the issues involved and affected by AIS. It is the county's desire also to be a step ahead of any AIS that threatens the county's inland and coastal water resources. The strategic plan's goals, objectives and activities that follow provide a guide for addressing the threats from AIS. The Bayfield County AIS Committee developed the vision and mission statements on the next page to steer all the AIS efforts. Appendix H shows AIS profiles that are common in Wisconsin and our region, and some species that are not yet widespread.

Vision

We will create and maintain a volunteer supported, locally based organization that takes an active role in lake water quality in Bayfield County. Bayfield County will use a collaborative and comprehensive approach to educate target audiences, enforce laws and ordinances, inform the public, manage or eradicate existing populations and monitor susceptible or infested waters to protect our waters from aquatic invasive species. Safeguarding our high quality water resources will become everyone's responsibility.

Mission

The AIS Project Coordinator and the AIS Committee will develop, implement and execute a plan of action to prevent the spread of, manage and perhaps eradicate aquatic invasive species in Bayfield County waters.

Stakeholders Affected by Aquatic Invasive Species

This list attempts to include the many groups and interests impacted by AIS and those who will benefit from the implementation of this plan:

- Lakeshore Property Owners
- Residents and Visitors to Bayfield County
- Motorized Watercraft Users
- Non-motorized Watercraft Users
- Watercraft Retailers
- Service Industry Owners and Their Staff
- Towns, Cities, & Village's Tax Base
- County's Tax Base
- School Districts' Tax Base
- Red Cliff Band of Lake Superior Chippewa
- Anglers
- Bait Dealers and Bait Shop Owners
- Resort Owners and Their Clientele
- Outdoor Gear Retailers
- Watercraft Rental Retailers
- Retail Businesses
- Realtors
- Building Contractors

St. Croix River Association

Goals, Objectives and Activities

Please Note: Although the AIS Project Coordinator and AIS Committee are the authors of the following goals, objectives, and activities, many of the ideas for these activities came from the achievements and efforts performed in the past years by lake organizations and individuals.

For the following tables: BC = Bayfield County
PC = Bayfield County AIS Project Coordinator
Committee = Bayfield County AIS Committee
LWCD = Bayfield County Land and Water Conservation Department
TRD = Bayfield County Tourism and Recreation Department
BCUWEX = Bayfield County University of Wisconsin Extension
BCLO = Bayfield County Lake Organizations
Red Cliff = Red Cliff Band of Lake Superior Chippewa
LG = Local Governments (Towns, Cities and Village)

Those **Executors** who are ***bold and italicized*** are the primary Executor. Measurement Tools and Target End Time are per year unless otherwise noted.

Goal 1: Educate Bayfield County residents and visitors on aquatic invasive species threats to the county's waters.

		Executor	**Measurement Tools**	**Target End Time**
Objective 1: Conduct a mass media campaign to inform and educate residents and visitors about aquatic invasive species.	**Activity 1:** Send out an annual press kit to the press, radio and other media outlets to inform and encourage them to pass the AIS prevention and monitoring messages along.	PC, ***LWCD***	5 articles in the Ashland Daily Press	November 30
	Activity 2: Invite media to workshops and functions of AIS interest held in the county.	PC, LWCD, BCUWEX, ***BCLO***	50% press coverage	December 31
	Activity 3: Work with the Bayfield County Tourism and Recreation Department, local Chambers of Commerce, and outdoor recreation groups to put in AIS messages in yearly publications.	***PC***, BCUWEX, BCLO, TRD	AIS messages in 50% of publications	Pre-publication No later than November 30

Goal 1, Objective 1, continued		**Executor**	**Measurement Tools**	**Target End Time**
	Activity 4: Work with Bayfield UWEX in disseminating information through its publications.	PC, BCUWEX, ***BCLO***	AIS messages in 2 UWEX publications	December 31
	Activity 5: Work with utilities & local governments who regularly distribute mass mailings to contain an AIS insert periodically.	PC, LWCD, ***BCLO***	Inserts in 3 mass mailings	December 31
	Activity 6: Work with Northern Great Lakes Visitor Center and Cable Natural History Museum periodically to house a "traveling" display about AIS issues for their visitors to peruse.	PC, ***LWCD***, BCLO	300 visitors to view display	December 31
	Activity 7: Develop marketing/ educational tools for waterfront property owners that inform them of actions that help prevent AIS introductions.	***PC***, LWCD, BCLO, BCUWEX	3 tools	December 31
	Activity 8: Participate in annual DNR Drain Campaign and Landing Blitz Weekends			
Objective 2: Undertake a targeted educational effort on aquatic invasive species in order to reach specific, key audiences.	**Activity 1**: Present a display for outreach purposes at significant county events (County Fair, local festivals, fishing tournaments, etc.).	***PC***, LWCD, BCUWEX	5 events	December 31
	Activity 2: Host and promote workshops for specific audiences: resort owners, guides, realtors, watercraft retailers, lakeshore property owners, bait dealers, county departments, chambers, local governments and campground managers.	PC, TRD, BCUWEX, ***BCLO***, LWCD	3 workshops	September 30
	Activity 3: Develop and maintain a list of individuals available for guest lectures and provide them with handout materials.	***PC***, LWCD, BCLO	15 individuals on list from across county	October 31
	Activity 4: Present AIS information via guest lectures to classrooms, adult civic groups (Rotary, Lions), and children activity groups (4-H, Scouts).	***PC***, LWCD, BCLO	4 presentations	December 31

Goal 1, Objective 2, continued		**Executor**	**Measurement Tools**	**Target End Time**
	Activity 5: Design a simple and easily adaptable AIS education module to be used for grades K-12, and available on the LWCD website.	***PC,*** BCLO, LWCD	Completed module	September 1
	Activity 6: Provide a biennial in-service for teachers explaining the need to discuss AIS in their classrooms and provide them with educational materials and module.	***PC***, BCLO, LWCD	2 in-services	December 31
	Activity 7: Work with high school teachers to initiate a student's outreach program to take the WI Sea Grant "Attack Pack" around to schools.	***PC***	5 classrooms visited by high school students	December 31
Objective 3: Provide information via easily accessible means to the public at large.	**Activity 1**: Create a Bayfield County AIS website including links and reciprocal links. Also contain a sign-up for inclusion on an email AIS broadcast/information list, as well as activist links.	PC, ***LWCD***, BC Information Technology Dept.	Easy to use web page w/ trouble-free links; 200 hits thereafter	June 1 December 31
	Activity 2: Publish semi-annual AIS newsletters for local governments, lake associations, schools, state and federal agencies, media outlets, chambers, and other interested groups and individuals.	PC, ***LWCD***	200 addressees on list, unsolicited positive feedback	April 30 & October 31
	Activity 3: Establish a county email broadcast list for communicating news on AIS issues.	***PC***	200 addressees, unsolicited positive feedback	May 31
	Activity 4: Provide AIS material for interlibrary loan to public libraries in Bayfield County.	***PC***, LWCD	Materials provided 50 checkouts thereafter	May 1 December 31

Goal 2: Prevent the introduction of aquatic invasive species into Bayfield County waters.

		Executor	**Measurement Tools**	**Target End Time**
Objective 1: Institute a watercraft monitoring/ inspection program at boat landings in the county.	**Activity 1:** Prioritize lakes and landings in the county for establishing watercraft inspection programs based on data of known use, fish populations, surface acreage, surrounding property ownership, and AIS populations.	***PC***, WDNR, BCLO, LG	Interagency- and BCLO-accepted lake priority list	May 1
	Activity 2: Identify alternative sources for long-term financing of watercraft inspection programs.	PC, Committee, LWCD, TRD, ***LG***	2 successful financial partnerships, 2 grants requested and granted	October 15
	Activity 3: Assist towns, local lake organizations and others in setting up and maintaining boat landing inspection/monitoring programs.	PC, ***BCLO***, LG	5 priority landings that have programs, 10% yearly increase	May 1
	Activity 4: Coordinate landing coverage with WI DNR and WI Sea Grant watercraft inspectors, and DNR Boat Ambassadors.	***PC***, BCLO, LG	15 landings staffed in inland lakes and coastal areas	May 1
	Activity 5: Investigate the possibility of closing little used multiple landings at any particular lake so as to have better control of what is coming into the lake.	PC, BCLO, ***LG***, WDNR	2 landings considered	October 15
Objective 2: Maintain an inventory of each landing and regularly check for proper and adequate AIS signage, including maintenance of that signage.	**Activity 1:** Give each town a list of named lakes in their jurisdiction, the number of unnamed lakes, the type of access and location, and recommended AIS signage.	***PC***	2 communications with towns	Initially, May 15, February 28 & September 30

Goal 2, Objective 2, continued		**Executor**	**Measurement Tools**	**Target End Time**
	Activity 2: Encourage towns to establish a volunteer corps of lake users who visit the lakes often and can collect signage data.	PC, ***BCLO***	3 volunteers per town	May 1
	Activity 3: Contact towns each spring using a standardized form for feedback on their landings and signage.	PC, ***LWCD***	1 report per town received by LWCD	May1
	Activity 4: Encourage county to install AIS signs at landings to keep current on NR 40 Wisconsin state law.	PC, ***Committee*** BCLO	5 on major highways, 20 on major landings	May 1
Objective 3: Address the need/desire for boat washing facilities across the county.	**Activity 1:** Work with coastal towns, cities, Red Cliff Tribe, and National Park Service to determine the feasibility of washing stations for boats coming out of Lake Superior.	***PC***, LWCD, Committee	3 boat washing stations near coastal landings	May 1- June 1
	Activity 2: Work with the county's business groups to solicit interest for local washing facilities.	PC, TRD, ***BCLO***	Increase of 1 station around the county	May 1
	Activity 3: Work with media to advertise at reduced rates the locations of these washing facilities.	PC, TRD, ***BCLO***	3 PA to advertise location of facilities	June 1
	Activity 4: Work with WDNR, DATCP*, Federal Agencies, and others to mass publish the most current, most practical, most proper disinfecting procedures to be used 1) at boat landings, and 2) at washing stations or one's private residence. * Dept. of Agriculture, Trade & Consumer Protection	***PC***, BCLO	Public knowledge and follow-through with boat disinfection after use	May 1
Objective 4: Encourage AIS monitoring and prevention for all special events held on lakes.	**Activity 1:** Stay in communication with the regional DNR Fisheries Biologists regarding fishing tournaments or other permitted activities held on lakes.	PC, ***BCLO***	80% activities monitored	Per event

Goal 2, Objective 4, continued		**Executor**	**Measurement Tools**	**Target End Time**
	Activity 2: Communicate with resorts/businesses that host tournaments or recreational activities held on the lake.	PC, ***BCLO***	85% activities monitored	Per event
Objective 5: Maintain communication between the county and the state, and between the county and neighboring counties concerning AIS issues.	**Activity 1:** For each Superior Days, identify AIS priorities and present these to the state legislature, DNR, and DATCP if needed.	***Committee*** BC, BCUWEX	AIS issues presented as needed	February 10
	Activity 2: Keep abreast of and review state AIS legislation (*The Wheeler Report http://www.thewheelerreport.com/*) and respond accordingly; communicate with legislative members to advocate for their action on appropriate AIS measures.	PC, BCLO, ***Committee*** LWCD	2 communications 4 reviews	February 28, May 31, August 31 & November 30
	Activity 3: For AIS specific newsletters and mailings, include local legislators, Chair of the Natural Resources Board, DNR State AIS Coordinator.	PC, ***LWCD***	2 communications Regular feedback	April 30 & October 31
	Activity 4: Encourage DNR statewide AIS position to be located in northern WI where most AIS grant dollars are expended, most watercraft inspection occurs, and prevention efforts are most effective.	PC, BCLO, ***Committee*** LWCD	1 AIS-specific northern region staff person	April 30
Objective 6: Keep abreast of federal regulations regarding ballast water and AIS.	**Activity 1:** Keep abreast of federal laws, reauthorizations and regulations. [National Aquatic Invasive Species Act of 2007 (NAISA), http://www.ucsusa.org/invasive_species/the-national-aquatic-invasive-species-act.html]	PC, ***Committee***	2 reviews	March 30, September 30

Goal 2, continued		**Executor**	**Measurement Tools**	**Target End Time**
Objective 7: Encourage groups to apply for available grant funds.	**Activity 1:** Send regular email broadcasts of grant types and deadlines.	***PC***	2 grant applications per broadcast	November 30 & May 31
	Activity 2: Establish a web page of helpful hints, links, and other resources for writing grants.	***PC***, BC Information Technology Dept.	Website completed, thereafter 200 hits	July 1 December 31
	Activity 3: Develop a contact list of individuals around the county that will assist others with grant applications.	**PC**, LWCD, BCLO	10 individuals	May 31
Objective 8: Encourage donations/funding from various entities to fund AIS activities.	**Activity 1:** Encourage lake groups to request donations via their newsletters.	PC, ***BCLO***	$500 given	June 30
	Activity 2: Encourage towns to raise funds to support AIS activities.	PC, ***LG***	$500 raised	June 30

Goal 3: Monitor Bayfield County waters for the presence of aquatic invasive species.

		Executor	**Measurement Tools**	**Target End Time**
Objective 1: Encourage and support efforts to monitor waters for the presence of aquatic invasive species.	**Activity 1:** Solicit public interest via press notices for assistance with lakeshore and whole-lake monitoring programs.	***PC***, BCLO	30 volunteers	May 31
	Activity 2: Hold 2 Citizen Lake Monitoring Network (CLMN) AIS Monitoring workshops per year across the county.	***PC***, state personnel (DNR & UWEX), BCLO	10 individuals per training	July 15
	Activity 3. Explore an "Adopt-A-Lakeshore/Landing" program on lakeshores to monitor for invasive species.	***PC***, BCLO,	Program evaluated	October 31

Goal 3, Objective 1, continued		**Executor**	**Measurement Tools**	**Target End Time**
	Activity 4: Solicit civic groups to contribute time and effort to monitor for invasive species.	PC, ***BCLO***, Committee	5 groups	September 30
Objective 2: Establish programs/protocols for county departments who work on or near lakes and municipalities to assist in the monitoring and reporting of AIS.	**Activity 1**: Meet with personnel of these departments and municipalities educating them on AIS impacts, identification, simple monitoring procedures, and reporting protocols. Provide these departments and municipalities with identification material and educational pamphlets for their use.	***PC***, LWCD	4 county depts. and majority of municipalities	December 31
	Activity 2: Coordinate with Northwoods Cooperative Weed Management Area (NCWMA) and WDNR in developing and/or implementing established reporting procedures.	PC, ***LWCD***	Procedures established 50 citizen reports	April 30 December 31
Objective 3: Maintain an inventory of waters in the county that have populations of aquatic invasive species.	**Activity 1**: Coordinate with WDNR, Great Lakes Indian Fish & Wildlife Commission (GLIFWC), the US Forest Service (USFS), US Fish & Wildlife Service (FWS), and National Park Service (NPS) adding to and using their AIS inventory databases.	***PC***, LWCD	1 complete inventory	September 30
	Activity 2: Continue to attend NCWMA meetings and coordinate with its signatories on monitoring activities.	PC, ***LWCD***	6 meetings	December 31

Goal 4: Control the spread of existing aquatic invasive species present in Bayfield County waters.

		Executor	**Measurement Tools**	**Target End Time**
Objective 1: Keep documentation of the infested waters in the county, the level of infestations and management.	**Activity 1:** Maintain a database within the LWCD with locations of infestations on DNR maps and approximate acreage in collaboration with the WDNR SWIMS database.	PC, ***LWCD***, WDNR	1 Complete inventory	December 31
	Activity 2: Coordinate with WDNR and GLIFWC to track/survey for infestations and document management completed**.**	***PC***, LWCD	1 Complete database	September 30
	Activity 3: Communicate with lake groups on their management activities and record locations and types of management.	***PC***, LWCD	1 Complete database	September 30
Objective 2: Provide expertise on the available aquatic invasive species management options and management funding options via a website or easily accessible information.	**Activity 1:** Establish a web page with management options, possible funding sources, experts, contacts in state and federal agencies, and/or link to a WDNR webpage.	PC, ***LWCD***, WDNR	Initially, easy to use web page w/ trouble-free links; 200 hits thereafter	June 1
	Activity 2: Encourage WDNR to update its web pages to reflect most recent AIS science, management, and policy.	***PC***, Committee, LWCD	1 Up-to-date AIS WDNR website	March 31
Objective 3: Develop DNR-approved Rapid Response Plans for each AIS.	**Activity 1**: Work with WDNR to create templates for DNR AIS Rapid Response Grants depending on the infestation.	PC, LWCD, ***BCLO***	1 template available per AIS	December 31
	Activity 2: Work with the county and towns to address liability issues and grant sponsorship if the need arises.	***PC***, LWCD, BCLO	1 Liability Fact Sheet for county and towns	December 31

Goal 5: Sustain the implementation of the plan.

		Executor	**Measurement Tools**	**Target End Time**
Objective 1: Continue to seek funding for staff and AIS activities.	**Activity 1:** Apply for WDNR AIS Control Grant funds.	PC, ***LWCD***	1 WDNR AIS Control Grant application submitted	August 1
Objective 2: Seek dedicated AIS-staff time under the Land and Water Conservation Department.	**Activity 1:** Obtain approval from the Land Conservation Committee.	***LWCD***, Committee	Approval obtained	July 31
	Activity 2: Obtain approval from the Bayfield County Board.	***LWCD***, Committee	Approval obtained	July 31

Goals and Objectives - Summary

Goal 1: Educate Bayfield County residents and visitors on the problems posed by aquatic invasive species to the county's waters.

- Objective 1: Conduct a mass media campaign to inform and educate residents and visitors about AIS.
- Objective 2: Undertake a targeted educational effort on AIS in order to reach specific, key audiences.
- Objective 3: Provide information via easily accessible means to the public at large.

Goal 2: Prevent the introduction of aquatic invasive species into Bayfield County waters.

- Objective 1: Institute a watercraft monitoring/inspection program at boat landings in the county.
- Objective 2: Maintain an inventory of each landing and regularly check for proper and adequate AIS signage, including maintenance of that signage.
- Objective 3: Address the need/desire for boat washing facilities across the county.
- Objective 4: Encourage AIS monitoring and prevention for all special events held on lakes.
- Objective 5: Maintain a communication line between the county and the state and between the county and neighboring counties concerning AIS issues.
- Objective 6: Keep abreast of federal regulations regarding ballast water and AIS.
- Objective 7: Encourage groups to apply for available grant funds.
- Objective 8: Encourage donations/funding from various entities to fund AIS activities.

Goal 3: Monitor Bayfield County waters for the presence of aquatic invasive species.

- Objective 1: Encourage and support efforts to monitor waters for the presence of AIS.
- Objective 2: Establish programs/protocols for county departments who work on or near lakes and municipalities to assist in the monitoring and reporting of AIS.
- Objective 3: Maintain an inventory of waters in the county that have populations of AIS.

Goal 4: Control the spread of existing aquatic invasive species found to be present in Bayfield County waters.

- Objective 1: Keep documentation of the infested waters in the county, the level of infestations and management.
- Objective 2: Provide expertise on the available aquatic invasive species management options and management funding options via a website or easily accessible information.
- Objective 3: Develop DNR-approved Rapid Response Plans for each AIS.

Goal 5: Sustain the implementation of the plan.

- Objective 1: Continue to seek funding for staff and AIS activities.
- Objective 2: Seek dedicated AIS-staff time under the Land and Water Conservation Department.

Implementation

Primarily the AIS Project Coordinator working with lake associations, local governments, and appropriate county departments until December 31, 2019, at the expiration of DNR Grant AEPP-483-16, will implement the plan, once adopted by the County Board. The Bayfield County AIS Committee will also oversee this initial implementation and assist with it.

While creating this plan, the committee discussed long-term follow through of the activities that require regular, periodic input (newsletters, email broadcasts, grant assistance). Once established, many of the activities are hoped to be self-sustaining, or at least sustained with little additional input (website, towns' tracking of lakes and signage, educational presentations by individuals off the resource list, etc.). The AIS Committee will provide long-term oversight of the plan and will meet at least quarterly to assess and address AIS actions. Although, it is recognized that the plan would benefit from either dedicated staff time from the Land & Water Conservation Department (LWCD), or a dedicated staff person from LWCD to follow through with many of the regular activities of the plan.

Plan Monitoring and Evaluation

After the field season of each year, the AIS Project Coordinator will summarize the progress toward achieving the objectives and activities of the plan's goals, and share recommendations with the AIS Committee for review and consideration. The AIS Committee will make its suggested revisions to the plan and present these to the County Board for approval. The Project Coordinator and Bayfield County AIS Committee will reevaluate the plan every three years and revise accordingly.

Figures & Tables

Figure 1. The three major water basins of Wisconsin (WI).

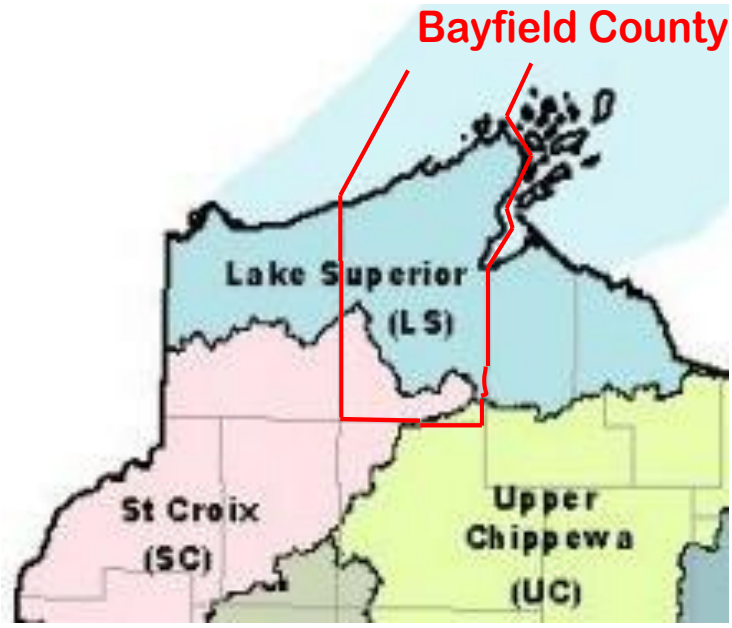


Figure 2. The three sub-water basins of Bayfield County, WI.

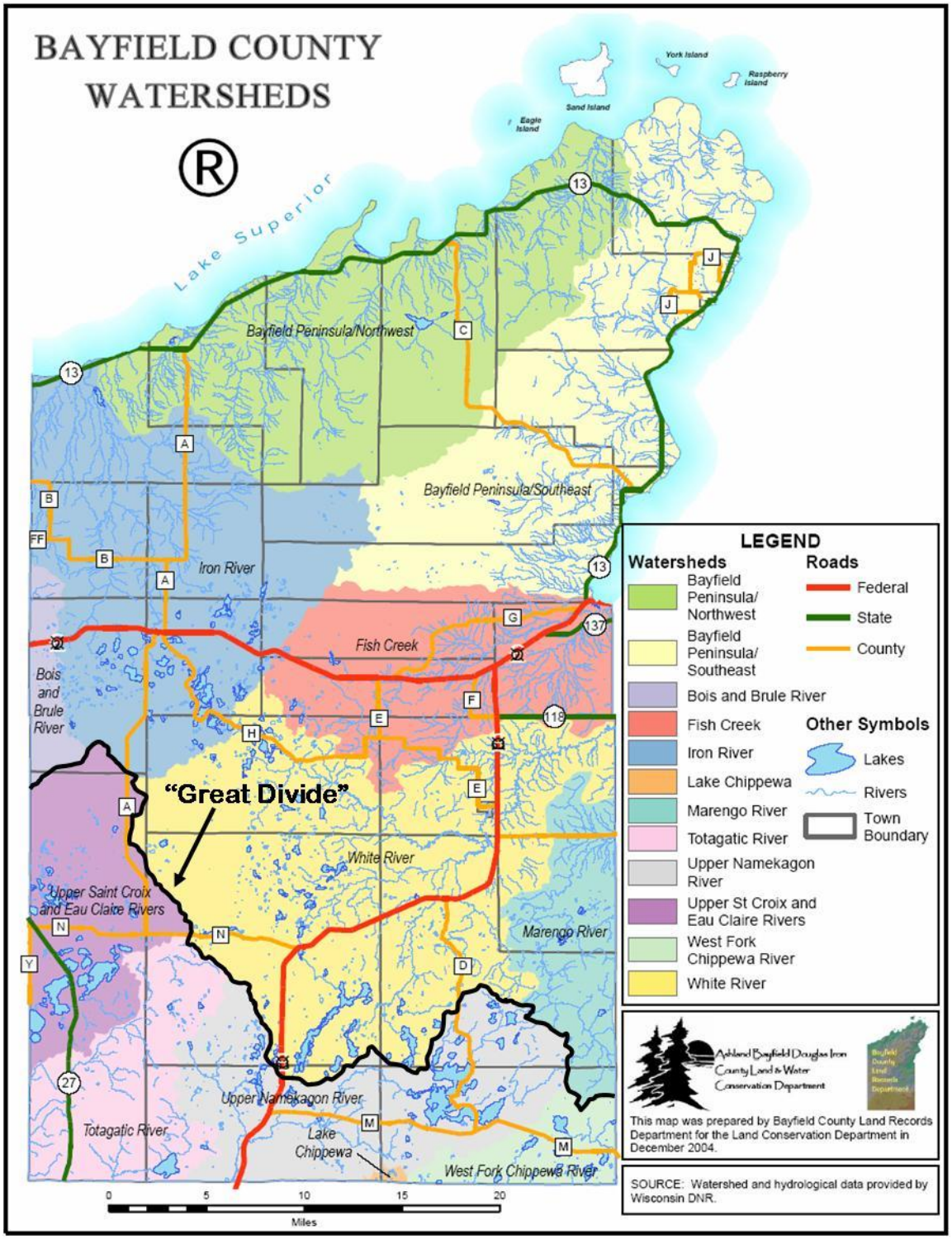


Figure 3. The watersheds of Bayfield County, WI and the Great Divide between the Lake Superior and Mississippi River Water Basins.

Table 1. This table shows the number of named lakes and total lake acreage in towns in Bayfield County, WI**.**
Wisconsin Lakes, Wisconsin Department of Natural Resources, PUB-FH-800 2005;
http://dnr.wi.gov/org/water/fhp/lakes/county/bayfield.htm
* Towns with 20 or more lakes
Towns without any inland lakes are abundant in riparian and wetland resources (Figure 3).

Town	# of lakes	Acreage		Town	# of lakes	Acreage
Barksdale	3	87		Kelly	0	0
Barnes*	36	4,401		Keystone	8	129
Bayfield	0	0		Lincoln	5	181
Bayview	0	0		Mason	0	0
Bell	6	416		Namakagon*	26	4,576
Cable*	20	1,323		Orienta	1	144
Clover	2	131		Oulu	0	0
Delta*	51	1,588		Pilsen	9	162
Drummond*	78	3,967		Port Wing	2	70
Eileen	3	26		Russell	0	0
Grand View*	33	1,676		Tripp	5	34
Hughes*	20	738		Washburn	10	124
Iron River*	34	2,003		**TOTALS**	**352**	**21,776**

Table 2. Priority wetlands and aquatic sites of Lake Superior Basin, Bayfield County**,** WI.
(Epstein et al 1997)
http://dnr.wi.gov/org/land/er/publications/cw/pdf_files/superior/superior_text.pdf

Priority Wetland Sites	Priority Aquatic Site
Bark Bay Slough State Natural Area	Fish Creek
Bayview Beach-Sioux River Slough	White River
Bibon Swamp	
Fish Creek Sloughs	
Frog Bay Tribal National Park	
Lost Creek State Natural Area	
Mawikwe Bay Cliffs	
Port Wing State Natural Area	
Raspberry River Slough	
Sand River Slough	
Sand Bay	
Sultz Swamp	

Table 3. The approximate amount of public lands in each of Bayfield County's towns.

Little public land	< 45% public land	± 50 % public land	± 75 % public land
Eileen	Cable	Barnes	Bayfield
Kelly	Clover	Barksdale	Bell
Lincoln	Iron River	Bayview	Drummond
Oulu	Keystone	Delta	Namakagon
Red Cliff	Mason	Grand View	
	Orienta	Hughes	
	Port Wing	Pilsen	
	Tripp	Russell	
		Washburn	

APPENDIX A

Resolution and Amendatory Ordinance for Establishing a Bayfield County Aquatic Invasive Species Committee

Resolution

No. 2007-09 (9)

Establishing a Bayfield County Aquatic Invasive Species (AIS) Committee

WHEREAS, aquatic invasive species can threaten the diversity and abundance of native species, negatively impact our fragile ecosystems, affect our ability to utilize public waters for recreational activities, minimize the aesthetic value of our water bodies, and have a harmful impact on Bayfield County's economy; and

WHEREAS, the County's lakes, rivers, streams, and wetlands will suffer irreversible damage from the unabated spread of aquatic invasive species within Bayfield County; and

WHEREAS, aquatic invasive species have been found in the Chequamegon Bay and some of the County's inland lakes; and

WHEREAS, the spread of aquatic invasive species poses a serious threat to the environmental quality and economic value all water bodies in Bayfield County.

NOW, THEREFORE, BE IT RESOLVED, that the Bayfield County Board of Supervisors assembled this 29th day of March, 2007, will establish a Bayfield County Aquatic Invasive Species (AIS) Committee with members representing the County's geographic areas and interests for the purpose of providing direction and input on the prevention, education and control of aquatic invasive species in Bayfield County bodies of water; and

BE IT FURTHER RESOLVED, that the Committee will review, recommend adoption and help oversee the implementation of a Bayfield County Aquatic Invasive Species Strategic Plan, and may make recommendations to the Bayfield County Board of Supervisors on actions needed to address aquatic invasive species issues in the County.

BAYFIELD COUNTY BOARD OF SUPERVISORS

William D. Kacvinsky, *Chairman*

John J. Blahnik, *Vice-Chairman*

David L. Good

Thomas J. Gordon

Kenneth Jardine

Harold A. Maki

Delores Kittleson

Shawn Miller

James Crandall

Wayne Williams

James Beeksma

Marco T. Bichanich

Brett T. Rondeau

STATE OF WISCONSIN)
)ss.
BAYFIELD COUNTY)

I, Scott S Fibert, Bayfield County Clerk, hereby certify that the foregoing is a true and correct copy of Volume 21, adopted by the Bayfield County Board of Supervisors at their meeting held on the 29th day of March, 2007.

Scott S. Fibert, Bayfield County Clerk

Amendatory Ordinance

No. 2007-10 (10)

Establishing a Bayfield County Aquatic Invasive Species (AIS) Committee

Sec. 2-3-18 Aquatic Invasive Species Committee

(a) Composition. The Aquatic Invasive Species Committee shall consist of seven (7) members, consisting of two (2) County Board members, one (1) Red Cliff Tribal representative and four (4) other members, including at least one (1) town board member, one (1) lake organization member and one (1) lake-related business member. In addition, the Committee may have advisory representatives from the following organizations: County Land Conservation Department, County UW-Extension Office, County Tourism & Recreation Department, Wisconsin Department of Natural Resources, U.S. Forest Service, and Great Lakes Indian Fish & Wildlife Commission.

(b) Duties. The Aquatic Invasive Species Committee shall:

(1) Provide direction and input on the prevention, education and control of aquatic invasive species in Bayfield County bodies of water.

(2) Provide oversight on issues, programs and management relating to aquatic invasive species in the County.

(3) Provide input into the development of a Bayfield County Aquatic Invasive Species Strategic Plan, and review, recommend adoption and help oversee the implementation of the Plan and future revisions to the Plan.

(4) Make recommendations to the Bayfield County Board of Supervisors on actions needed to address aquatic invasive species issues in the County.

Adopted by the Bayfield County Board of Supervisors this 29th day of March, 2007.

By: _____
William D. Kacvinsky, County Board Chairman

Attested: _____ Vice
Scott S. Fibert, Bayfield County Clerk

Resolution

No. 2008-11 (19)

APPROVING THE BAYFIELD COUNTY AQUATIC INVASIVE SPECIES STRATEGIC PLAN

WHEREAS, aquatic invasive species (AIS) have spread into watersheds in Bayfield County and are present along coastal waterways in the county, posing increased risks to un-infested waters, and potentially threatening water quality, wildlife habitat, property values, and the tourism industry in the region, and;

WHEREAS, the residents and professionals in and outside of the county understand that to address AIS effectively, many activities performed by many entities are needed, and;

WHEREAS, the resulting plan identifies goals, objectives, and activities for implementation by many entities across the county to prevent, monitor, manage and control AIS in the county, and sustain these efforts into the future, and;

WHEREAS, two public informational meetings were held and public comments were received, reviewed, and added to the plan where deemed necessary;

WHEREAS, at their April 3, 2008 meeting, the AIS Committee approved the plan with changes made based on public input during the comment period, and forwarded the approved plan to the Bayfield County Board for their review and action.

NOW, THEREFORE, BE IT RESOLVED, that the Bayfield County Board of Supervisors assembled this 15th day of April, 2008, does approve the Bayfield County Aquatic Invasive Species Strategic Plan to be effective immediately.

BAYFIELD COUNTY BOARD OF SUPERVISORS

William D. Kacvinsky, *Chairman*

John J. Blahnik, *Vice-Chairman*

David L. Good

Thomas J. Gordon

Kenneth Jardine

Harold A. Maki

Delores Kittleson

Shawn W. Miller

Wayne H. Williams

James A. Crandall

James Beeksma

Marco T. Bichanich

Brett T. Rondeau

STATE OF WISCONSIN)
)ss.
BAYFIELD COUNTY)

I, Scott S. Fibert, Bayfield County Clerk, hereby certify that the foregoing is a true and correct copy of Volume 21, adopted by the Bayfield County Board of Supervisors at their meeting held on the 15th day of April, 2008.

Scott S. Fibert, Bayfield County Clerk

APPENDIX B

List of Outstanding Resource Waters (ORW) and Exceptional Resource Waters (ERW) of Bayfield County

A classification Mandate from Department of Natural Resources:
Chapter NR 102 WATER QUALITY STANDARDS FOR WISCONSIN SURFACE WATERS
(http://dnr.wi.gov/org/water/wm/wqs/codes/nr102.pdf)

NR102.10 = Outstanding Resource Waters, NR102.11 = Exceptional Resource Waters
List below is from: http://dnr.wi.gov/org/water/wm/wqs/orwerw/orwerw_county.pdf

River/Creek Name	Portion Within ORW/ERW	Class
Bark Bay Slough	All	ORW
Bark River	All	ORW
Big Brook	All	ORW
Birch Run	All	ORW
Bolen Creek	All	ERW
Cranberry River	All	ORW
Cranberry River Trib. T50N R7W S26	All	ORW
Dahl Creek	Al	ERW
DeChamps Creek	All	ORW
DeChamps Creek Trib. S32 T48N R8W	All	ORW
E Fork Cranberry River	All	ORW
E Fork Flag River	All	ERW
E Fork Iron River	All	ORW
E Fork White River	Downstream from Delta Lake	ORW
Eighteen Mile Creek	All	ORW
Eighteen Mile Creek Trib. S8 T44N R6W	All	ORW
Fish Creek (Main)	All	ORW
Flag River	South of town rd S27 T50N R8W	ORW
Four Mile Creek	All	ORW
Hawkins Creek	S1 T44N R5W to Morgan Creek	ERW
Hill Creek	All	ORW
Lenawee Creek	Lower 1.0 mi to outlet	ORW
Little Brook		ERW
Little Pine Creek	All	ORW
Little Sioux River	All	ORW
Long Lake Branch	Below Drummond Lk to White R	ORW
Long Lake Branch Trib. S16 T45N R6W	All	ORW
Long Lake Branch Trib. S17 T45N R6W	All	ORW
Long Lake Branch Trib. S22 T45N R7W	All	ORW
Long Lake Branch Trib. S27 T45N R7W	All	ORW
Marengo River Trib. S17 T44N R5W	All	ERW
Marengo River Trib. S20 T44N R5W	All	ERW
Marengo River Trib. S21 T44N R5W	All	ERW
Marengo River Trib. S3 T44N R5W	All	ERW
Marengo River Trib. S9 T45N R5W	All	ERW
Middle Creek	All	ORW
N Branch Pikes Creek	All	ORW
N Fork Fish Creek	All	ORW
N Fork Fish Creek Trib. S13 T47N R6W	All	ORW

River/Creek Name	Portion Within ORW/ERW	Class
N Fork Whittlesey Creek	Below Rd crossing @ S20 T44N R5W	ORW
Namekagon Lake	All	ORW
Namekagon River	the outlet of Lake Namekagon to the Sawyer County line	ORW
Onion River	All	ORW
Onion River Trib. T50N R4W S31	All	ORW
Pikes Creek	All	ORW
Pine Creek	All	ORW
Pine Creek Trib. S10 T47N R6W	All	ORW
Reefer Creek	Headwaters downstream to S32 T49N R9W	ERW
S Fork White River	All	ORW
Sand Bay Trib. S6 T51N R4W	All	ERW
Saxine Creek	All	ERW
Schacte Creek	All	ORW
Sioux River	All	ORW
Sioux River Trib. S32 T49N R5W	All	ORW
Siskiwit Bay Trib. S34 T51N R6W	All	ERW
Siskiwit River	From spring source in S24 T50N R6W downstream to Siskiwit Falls	ERW
Slaughter House Creek	All	ERW
Squaw Bay Tributary T51N R6W S23	All	ERW
Squaw Creek	All	ERW
Tader Creek	All	ORW
Thompson Creek	All	ORW
Townsend Creek	All	ORW
Twenty Mile Creek	All	ORW
Whiskey Creek Trib. S12 T44N R5W	All	ERW
White River	Downstream to Pike's Bridge	ORW
White River	Below Pike's Bridge	ERW
White River Trib. S26 NWNE T46N R7W	All	ERW
White River Trib. S26 SWNE T46N R7W	All	ERW
Whittlesey Creek	Below N Fk to Lk Superior	ORW

Lake Name	Portion Within ORW/ERW	Class
*Buskey Bay Lake	All	ORW
Diamond Lake	All	ORW
*Eagle Lake	All	ORW
*Flynn Lake	All	ORW
*Hart Lake	All	ORW
*Hildur Lake	All	ORW
Middle Eau Claire Lake	All	ORW
*Millicent Lake	All	ORW
Owen Lake	All	ORW
Pike Chain of Lakes:	All	ORW
*Star Lake	All	ORW
Twin Bear Lake	All	ORW
Upper Eau Claire Lake	All	ORW

* Pike Chain of Lakes – All ORW

APPENDIX C

List of Named Lakes by Town

Also includes a few unnamed 20+ acre lakes

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Barksdale	Bladder Lake (Kransz)	81	SEEPAGE	Boat Ramp	2756200
	McGinnis Lake	3	SEEPAGE	Trail	2768000
	Summit Lake	3	SEEPAGE	Wilderness	2775100
Barnes	Barnes Lake	16	ACID BOG	None	2743000
	Bass Lake T45N R09W S06	20	SEEPAGE	None	2451800
	Birch Lake T44N R09W S04	129	DRAINAGE	Nav Water	2743200
	Blue Lake	21	SEEPAGE	None	2454000
	Bony Lake	191	DRAINAGE	Nav Water	2742500
	Breakfast Lake	11	SEEPAGE	Trail	2454800
	Connor Lake	14	SEEPAGE	None	2458400
	Cranberry Lake T44N R09W S30	131	DRAINAGE	Nav Water	2741700
	Devils Lake	23	DRAINAGE	Nav Water	2742800
	Ducetts Lake	8	SEEPAGE	None	2461800
	Eau Claire Lake, Lower*	802	DRAINAGE	Boat Ramp	2741600
	Eau Claire Lake, Middle	902	DRAINAGE	Boat Ramp	2742100
	Eau Claire Lake, Upper	996	DRAINAGE	Boat Ramp	2742700
	Eightmile Lake, East	35	SEEPAGE	None	2462200
	Eightmile Lake, West	16	SEEPAGE	Wilderness	2598800
	Ellison Lake	110	SEEPAGE	None	2463300
	George Lake	46	SEEPAGE	Wilderness	2465700
	Hay Lake T45N R09W S18	16	SEEPAGE	Wilderness	2468600
	Henderson Lake	33	SEEPAGE	Roadside	2468800
	Idlewild Lake	16	SEEPAGE	None	2470300
	Island Lake T45N R09W S18	59	SEEPAGE	Boat Ramp	2470800
	Kelly Lake	56	SEEPAGE	None	2472000
	Little Island Lake	70	SEEPAGE	None	2476800
	Mimi Lake	10	SEEPAGE	Trail	2482600
	Ole Lake T45N R09W S18	13	SEEPAGE	None	2487100
	Pickerel Lake	81	SEEPAGE	Boat Ramp	2489200
	Priest Lake	29	SEEPAGE	None	2491400
	Robinson Lake	91	DRAINAGE	Boat Ramp	2743300
	Sand Bar Lake	118	SEEPAGE	Nav Water	2494900
	Shunenberg Lake	44	DRAINAGE	Nav Water	2743600
	Swett Lake (Sweet)	88	DRAINAGE	Trail	2743700
	Tars Pond	2	DRAINAGE	None	2750400
	Tomahawk Lake	134	SEEPAGE	Boat Ramp	2501700
	Turtle Lake	22	SEEPAGE	Wilderness	2502900
	Twin Lake	28	SEEPAGE	None	2503300
	Unnamed T44N R09W S29-2	20	SEEPAGE	None	2587900
Bell	Crystal Lake T49N R06W S10	4	SEEPAGE	Wilderness	2759700
	Little Siskiwit Lake	44	DRAINAGE	None	2882200
	Lost Creek Slough	15	DRAINAGE	Nav Water	2881400
	Perch Lake T50N R06W S22	22	SEEPAGE	Wilderness	2770900
	Siskiwit Lake	330	DRAINAGE	Boat Ramp	2882300
	Siskiwit Springs	1	SPRING POND	Trail	

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Cable	Cable Lake	166	DRAINAGE	Boat Ramp	2729700
	Dawn Lake	10	ACID BOG	None	2460000
	Fuller Lake	5	SEEPAGE	None	2465400
	Henry Lake	29	SEEPAGE	None	2729500
	Joann Lake	12	SPRING POND	None	2732200
	Lerche Lake	18	SEEPAGE	None	2475200
(also in Drummond)	Little Rosa Lake	7	SEEPAGE	None	2730100
	Ole Lake T43N R08W S27 & 28	23	ACID BOG	None	2487000
	Perry Lake	50	SEEPAGE	Boat Ramp	2730800
	Price Lake	74	SEEPAGE	None	2491300
	Porter Lake, North	26	SEEPAGE	None	2731300
	Porter Lake, South	12	SEEPAGE	None	2731200
(also in Drummond)	Rosa Lake	43	SEEPAGE	None	2493200
(half in Drummond)	Lake Tahkodah	152	SEEPAGE	Boat Ramp	2473500
	Totagatic Lake	537	DRAINAGE	Boat Ramp	2705000
	Unnamed T43N R08W S1 (Herring ?)	14			2730000
	Unnamed T43N R07W S16	20	SEEPAGE	Nav Water	2731100
	Unnamed T43N R07W S3	29	SEEPAGE	None	2574300
	West Lake T43N R08W S15	8	SEEPAGE	None	2600100
	Wiley Lake	60	DRAINAGE	Nav Water	2729800
Clover	Bark Bay Slough	116	DRAINAGE	Boat Ramp	2881200
	Lenawee Lake	15	ACID BOG	Boat Ramp	2880300
Delta	Bass Lake T46N R07W S28	76	SEEPAGE	Boat Ramp	2901100
	Basswood Lake	119	SPRING POND	Trail	2904900
	Bear Lake	32	DRAINAGE	Trail	2901800
	Beaver Lake	19	SEEPAGE	Trail	2755600
	Bell Lake (Belle)	14	SEEPAGE	None	2755700
	Bellevue Lake (Long)	65	SEEPAGE	Boat Ramp	2755800
	Bog Lake	12	SPRING POND	Roadside	2902100
	Broadax Lake T46N R07W S33	4	SEEPAGE	None	2756800
	Bullhead Lake T46N R07W S08	7	SEEPAGE	Trail	2765300
	Camp One Lake	37	SEEPAGE	Boat Ramp	2965700
	Camp Two (Buck) T46N R07W S04	4	SEEPAGE	None	2757600
	Camp Two Lake T46N R08W S06	23	SEEPAGE	Trail	2757700
	Canthook Lake	34	SEEPAGE	None	2757800
	Carson Pond	5	SPRING POND	None	2901400
	Deep Lake T46N R07W S04	13	SEEPAGE	None	2760000
	Delta Lake	180	DRAINAGE	Boat Ramp	2901700
	Eagle Lake (Murray, Inch)	170	DRAINAGE	Nav Water	2902900
	Everett Lake	18	SEEPAGE	None	2761600
	Flynn Lake T46N R08W S03	29	DRAINAGE	Nav Water	2902800
	Frog Lake	8	SEEPAGE	Wilderness	2762300
	Getsey Lake	19	SEEPAGE	None	2762400
	Happles Lake	24	SEEPAGE	None	2762800
	Hay Lake T46N R07W S07	59	DRAINAGE	Boat Ramp	2901600
	Heart Lake	24	SEEPAGE	None	2763100
	Hilder Lake (Hildur) (Bluebird)	67	DRAINAGE	Boat Ramp	2902600
	Hollibar Lake	7	SEEPAGE	None	2763700
	Inch Lake	31	SEEPAGE	None	2764300
	Kern Lake	91	SEEPAGE	None	2900500
(also in Iron River)	Lake Ruth	66	SEEPAGE	Boat Ramp	2765900
	Lemon Lake	6	SEEPAGE	Trail	2766400
	Lester Lake	24	SEEPAGE	None	2766500

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
(half in Drummond)	Line Lake	8	SEEPAGE	Wilderness	2766700
Delta (con't)	Mud Flat Lake	11	SEEPAGE	Nav Water	2769400
	Mud Lake T46N R07W S29	8	ACID BOG	Wilderness	2769600
	Muskellunge Lake (Butte)	44	SEEPAGE	None	2903600
	Mystery Lake	14	SEEPAGE	None	2769800
	Phantom Lake (Pantheon)	44	SEEPAGE	None	2771200
	Rainbow Lake	14	SEEPAGE	Wilderness	2771900
	Sawmill Lake	12	SEEPAGE	None	2773300
	Silver Lake	26	SEEPAGE	None	2773800
	Spirit Lake	35	SPRING POND	None	2904800
	Square Lake	3	SEEPAGE	Wilderness	2774600
	Steelhead Lake (Ell)	17	SEEPAGE	Trail	2774800
	Swede Lake	27	SEEPAGE	Wilderness	2775300
	Tea Cup Lake	1	ACID BOG	Wilderness	2775500
	Tower Lake	13	SEEPAGE	Trail	2775800
	Trout Lake	14	SEEPAGE	None	2775900
	Two Lake	8	DRAINAGE	Trail	2904300
	Unnamed T46N R08W S1	23	DRAINAGE	None	2901900
	West Lake T46N R08W S11	11	ACID BOG	Wilderness	2832600
	Wolf Lake	12	SEEPAGE	None	2833000
Drummond	Anderson Lake	33	SEEPAGE	Wilderness	2754200
	Anodanta Lake (Bass L. No 4)	26	DRAINAGE	Boat Ramp	2898200
	Armstrong Lake	48	SEEPAGE	Wilderness	2754600
	Arrowhead Lake (Bass L. No 3)	33	SPRING POND	Wilderness	2898500
	Balsam Pond T44N R07W S13	7	ACID BOG	Trail	2754800
	Bass Lake T45N R07W S19	56	SEEPAGE	Boat Ramp	2754900
	Bass Lake T44N R07W S33	18	SEEPAGE	None	2755000
	Bear Pond	10	SEEPAGE	Wilderness	2755400
	Bearsdale Springs, Lower	2	SPRING POND	Boat Ramp	2749500
	Bearsdale Springs, Upper	3	SPRING POND	Trail	2749700
	Big Brook Lake	34	SPRING POND	Trail	2730400
	Bufo Lake	21	SEEPAGE	Wilderness	2757000
	Bullhead Lake T45N R07W S20	8	SEEPAGE	Wilderness	2757200
	Camp Lake	13	SEEPAGE	Trail	2456400
	Camp Nine Lake	10	SEEPAGE	Boat Ramp	2456500
	Cisco Lake (First Bass)	95	SEEPAGE	Boat Ramp	2899200
	Claire Lake	4	SEEPAGE	Trail	2457200
	Clay Lake	31	SEEPAGE	Wilderness	2758500
	Cranberry Lake T45N R07W S03	4	ACID BOG	Wilderness	2759200
	Dinner Camp Lake	14	SEEPAGE	Wilderness	2472800
	Drummond Lake	99	DRAINAGE	Boat Ramp	2899400
	Dry Well Lake T45N R07W S07	4	SEEPAGE	Wilderness	2760800
	Egg Lake	4	ACID BOG	Wilderness	2899500
	Esox Lake (Bass Lake #2)	51	DRAINAGE	Trail	2761400
	Flakefjord Lake (Chelonia)	11	SEEPAGE	Wilderness	2762000
	Flynn Lake T45N R07W S30	64	SEEPAGE	Trail	2762100
	Grass Lake T44N R07W S04	15	SEEPAGE	None	2472900
	Half Moon Lake T44N R08W S24	15	SEEPAGE	None	2472900
	Hammil Lake (Hammel)	83	SEEPAGE	None	2467900
	Holly Lake	15	SEEPAGE	Wilderness	2473000
	Flakefjord Lake (Chelonia)	11	SEEPAGE	Wilderness	2762000
	Horseshoe Lake T44N R07W S19	7	SEEPAGE	None	2473100
	Hyatt Spring T44N R08W S05	6	SPRING POND	Wilderness	2749900

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Drummond	Johnson Springs T45N R07W S22	2	SPRING POND	Boat Ramp	2899000
(S tip in Cable)	Lake Owen	1,323	DRAINAGE	Boat Ramp	2900200
(con't)	Lake Sixteen	34	SEEPAGE	Wilderness	2473400
(half in Cable)	Lake Tahkodah	152	SEEPAGE	Boat Ramp	2473500
	Lamereau Lake	10	SEEPAGE	Wilderness	2473900
	Lee Lake	5	ACID BOG	Wilderness	2766300
(half in Delta)	Line Lake				
	Little Hidden Lake	3	ACID BOG	Wilderness	2898000
(also in Cable)	Little Rosa Lake	7	SEEPAGE	None	2730100
	Little Star Lake T45N R07W S10	6	ACID BOG	Trail	2766900
	Lund Lake	22	SEEPAGE	Wilderness	2767800
	Mill Pond Lake (Rust Flowage)	62	DRAINAGE	Wilderness	2899700
	Mirror Lake T45N R07W S16	17	SEEPAGE	Wilderness	2768600
	Motyka Lake	12	SEEPAGE	Roadside	2483600
	Mountain Lake	11	SEEPAGE	Wilderness	2483700
	Muck ("Chelonia" Plat Book)Lake	9	SEEPAGE	None	2769300
	Mud Lake ("Sugarbush")	181	SEEPAGE	Wilderness	2484600
	Nancy Lake	7	SEEPAGE	Wilderness	2486000
	Nelson Lake	21	SEEPAGE	Wilderness	2770000
	Northeast Lake	88	SEEPAGE	Trail	2486500
	Nymphia Lake (Numphia)	10	ACID BOG	Boat Ramp	2770300
	Overby Lake (Blaisdell)	8	ACID BOG	Wilderness	2770500
	Perch Lake T45N R07W S05	70	SEEPAGE	Boat Ramp	2770700
	Physa Lake	10	SEEPAGE	Wilderness	2771300
	Picture Lake (Pitcher)	58	SEEPAGE	Trail	2489300
	Pigeon Lake	213	SEEPAGE	Boat Ramp	2489400
	Planorbis Lake	10	SEEPAGE	Wilderness	2771700
	Pond Lake T44N R08W S17	42	ACID BOG	Wilderness	2750900
	Pond Lake T45N R08W S14	8	ACID BOG	Boat Ramp	2771800
	Pot Lake	9	SEEPAGE	Wilderness	2898700
	Rana Lake T45N R07W S20	6	SEEPAGE	Wilderness	2772000
	Reynard Lake	33	SEEPAGE	Wilderness	2772200
	Roger Lake T44N R07W S10	24	DRAINAGE	Trail	2900000
(also in Cable)	Rosa Lake	43	SEEPAGE	None	2493200
	Ryberg Lake	8	SEEPAGE	Wilderness	2494100
	Samoset Lake (N Bass)	46	SEEPAGE	None	2494800
	Shunenberg Springs	16	SPRING POND	Trail	2750200
	Smear Lake	14	ACID BOG	Wilderness	2497600
	Smith Lake	31	DRAINAGE	Nav Water	2743500
	Star Lake	234	DRAINAGE	Boat Ramp	2898400
	Stewart Lake	24	SEEPAGE	Wilderness	2499400
	Stratton Ponds	7	SEEPAGE	Wilderness	2774900
	Travers Lake	20	SEEPAGE	Trail	2502200
	Wabigon Lake (Hubigoon)	35	SEEPAGE	Trail	2832300
	Wilderness Lake	63	SEEPAGE	Wilderness	2600500
	Willipyro Lake (Whipfast, Wiparo)	77	SEEPAGE	None	2473600
	Wishbone Lake	21	SEEPAGE	Wilderness	2832900
Eileen	Fish Creek Flowage	1	SEEPAGE	None	2887800
	Fish Creek Spring	2	SPRING POND	Wilderness	2888200
	Unnamed T47N R05W S1-6	23	DRAINAGE	Roadside	2887800
Grand View	Adeline Lake	3	SEEPAGE	Wilderness	2753800
	Atkins Lake	176	DRAINAGE	Boat Ramp	2734000
	Bass Lake T44N R06W S24	78 (73)	SEEPAGE	Boat Ramp	2733600

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Grand View	Bullhead Lake T44N R05W S29	36	SEEPAGE	Wilderness	2456000
	Club Lake	83	SEEPAGE	Wilderness	2733900
	Coburn Lake	10	SEEPAGE	Wilderness	2758700
	Coffee Lake	54	DRAINAGE	Wilderness	2922200
	Cranberry Lake T44N R06W S34	58	SEEPAGE	None	2732800
	Crane Lake	22	SEEPAGE	Wilderness	2759300
	Crystal Lake T44N R06W S32	111	SEEPAGE	Boat Ramp	2897300
	Davis Lake, East	12	ACID BOG	Trail	2462100
	Davis Lake, West (Osborn)	16	ACID BOG	Trail	2598700
	Deer Lake	16	SEEPAGE	None	2760200
	Diamond Lake	341	DRAINAGE	Boat Ramp	2897100
	Eighteen-mile Creek Spring	6	SPRING POND	Trail	2896900
	Friedbauer Lake	21	ACID BOG	None	2734900
	Holmes Lake	13	SPRING POND	None	2735000
	Jackson Lake	142	DRAINAGE	Nav Water	2734200
	Knotting Lake (Aqua)	80	SEEPAGE	Wilderness	2734700
	Lizzie Lake (Davis)	17	SEEPAGE	Wilderness	2896800
(mostly in Namak.)	Namakagon Lake (Spring, Garden)	3,227	DRAINAGE	Boat Ramp	2732600
	Osborn Lake	16	DRAINAGE	None	2895400
	Porcupine Lake	75	SPRING POND	Trail	2896600
	Pre-Emption Creek Pond	3	SPRING POND	Trail	2895700
	Ree Lake	25	ACID BOG	None	2765800
	Sage Lake	6	SEEPAGE	None	2896100
	Siegal Lake	6	SEEPAGE	Trail	2773700
	Southwest Lake (South)	31	SEEPAGE	Wilderness	2498200
	Spruce Lake T44N R05W S27	17	ACID BOG	Wilderness	2774500
	Spruce Lake T44N R06W S14	5	SPRING POND	Wilderness	2498700
	Tank Lake T45N R06W S20	18	SEEPAGE	None	2775400
	Taylor Lake	94	SEEPAGE	Boat Ramp	2734100
	Trapper Lake	84	SEEPAGE	None	2734500
	Ahmeek Lake	53	SEEPAGE	None	2753900
Hughes	Camp Eleven Lake	13	SEEPAGE	Wilderness	2757400
	Carroll Lake	19	SEEPAGE	None	2758000
	Crystal Lake T47N R09W S15	94 (91)	SEEPAGE	None	2874700
	Deep Lake T47N R09W S14	103	SEEPAGE	None	2760100
	Erick Lake	10	SEEPAGE	Wilderness	2761200
	Hostrawser Lake	21	SEEPAGE	None	2764200
	Iron Lake	249	SEEPAGE	Wilderness	2877000
	Iron River Flowage	76	SPRING POND	Wilderness	2876000
	Jesse Lake	11	SEEPAGE	Wilderness	2764800
	Jones Lake	48	SEEPAGE	Wilderness	2765200
	Lindgren Lake	7	SEEPAGE	Wilderness	2766600
	Moreland Lake	22	SEEPAGE	Wilderness	2769200
	Mud Lake T47N R09W S13	1	SPRING POND	None	2876800
	Richardson Lake	25	ACID BOG	Wilderness	2772400
	Russell Lake	12	SEEPAGE	Wilderness	2772900
	Simpson Lake	13	SEEPAGE	None	2774000
	Angus Lake	34	SEEPAGE	None	2754400
Iron River	Bass Lake (Pike Chain)	41	SEEPAGE	Boat Ramp	2755200
	Beaver House Lake	2	ACID BOG	None	2755500
	Bismarck Lake	61	SEEPAGE	Wilderness	2876600

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Iron River (con't)	Buskey Bay	100	SEEPAGE	Boat Ramp	2903800
	Cat Lake	5	SEEPAGE	None	2758100
	Crooked Lake	93	SEEPAGE	None	2759600
	Duck Lake T47N R08W S26	22	SEEPAGE	None	2760900
	Fire Lake	46	SEEPAGE	None	2761800
	Five Island Lake	48	SEEPAGE	None	2761900
	Half Moon (Millpond) T47N R08W S17	106	SEEPAGE	Boat Ramp	2762700
	Hart Lake (Heart,Wiehe)	259	SEEPAGE	Nav Water	2903200
	Hicks Lake	6	SEEPAGE	Roadside	2763400
	Hobbs Lake	13	SEEPAGE	Wilderness	2763500
	Island Lake T47N R08W S24	27	SEEPAGE	Wilderness	2764600
	Johnson Lake	11	SEEPAGE	None	2765000
(also in Delta)	Lake Ruth	66	SEEPAGE	Boat Ramp	2765900
(N tip in Tripp)	Long Lake T47N R08W S02	263	SEEPAGE	Boat Ramp	2767100
	Loon Lake	33	SEEPAGE	Boat Ramp	2767400
	Lost Lake	25	SEEPAGE	None	2767600
	McCarry Lake	32	DRAINAGE	Roadside	2903400
	Millicent Lake (Pike)	183	DRAINAGE	Nav Water	2903700
	Moon Lake	41	SEEPAGE	Boat Ramp	2768900
	Mullenhoff Lake (Mellenhoff)	69	SEEPAGE	None	2876500
	Nestle Lake	6	SEEPAGE	None	2770100
	Perch Lake T47N R08W S20	25	SEEPAGE	None	2770800
	Peterson Lake	18	SEEPAGE	Trail	2771100
	Pike Lake	17	SEEPAGE	Nav Water	2904000
	Pine Lake T47N R08W S22	14	SEEPAGE	Boat Ramp	2771600
	Roger Lake T47N R08W S30	30	SEEPAGE	None	2772600
	Spider Lake T47N R08W S17	124	SEEPAGE	None	2876200
	Steckbaur Lake	3	SEEPAGE	Wilderness	2774700
	Topside Lake	56	SEEPAGE	Wilderness	2775700
	Twin Bear Lake (Crow)	172	SEEPAGE	Boat Ramp	2903100
	Wentzel Lake	18	SEEPAGE	None	2832500
Keystone	Boris Lake	2	SEEPAGE	None	2756600
	Buck Lake	6	SEEPAGE	Wilderness	2756900
	Finger Lake	76	SEEPAGE	None	2965500
	Nokomis Lake	8	SEEPAGE	Wilderness	2765500
	Patsy Lake	4	SEEPAGE	Wilderness	2770600
	Toothpick Lake	7	SEEPAGE	Wilderness	2775600
	Tub Lake	11	SEEPAGE	Boat Ramp	2776000
	Wanoka Lake	15	SEEPAGE	Trail	2832400
Lincoln	Birch Lake T45N R05W S22	12	SEEPAGE	None	2756100
	Indian Lake	26	SEEPAGE	None	2764500
	Marengo Lake	99	DRAINAGE	Boat Ramp	2921100
	Olson Lake	20	SEEPAGE	None	2919900
	Unnamed T45N R05W S30-2D	24	SEEPAGE	None	2793400
Namakagon	Beaver Lake*T43N R05W S36	24	SEEPAGE	Wilderness	1834500
	Birch Lake (Emerson No. 2)	9	SEEPAGE	Wilderness	2453600
	Buffalo Lake	179	SEEPAGE	None	1837700
	Casper Lake (Hoof)	10	ACID BOG	None	1839700
	Chippewa Lake	274	DRAINAGE	Boat Ramp	2431300
	Dells Lake	103	SEEPAGE	None	1844500
	Duck Lake T43N R05W S13	28	DRAINAGE	None	2431000

Town	Lake Name	Acreage	LAKE TYPE	Access	Water Body Identification Code (WBIC)
Namakagon (con't)	Emerson Lake (Emerson #4)	9	SEEPAGE	None	2463700
	Five Lake (Fifth)	63	SEEPAGE	None	1858900
	Frels Lake (Emerson # 1)	11	SEEPAGE	None	2465100
	Ghost Lake	132	SEEPAGE	Wilderness	2423900
	Hadley Lake*	39	DRAINAGE	Wilderness	2426400
	Hidden Lake	34	SEEPAGE	Wilderness	2469000
	Hildebrand Lake (Emerson #3)	17	SEEPAGE	Boat Ramp	2469300
	Little Bass Lake	43	SEEPAGE	None	2735200
	McCloud Lake (McLeod)	64	SEEPAGE	Boat Ramp	1865300
(also in Grand View)	Namekagon Lake (Spring, Garden)	3,227	DRAINAGE	Boat Ramp	2732600
	Patsy Lake*T43N R06W S33	56	SEEPAGE	Trail	1872400
	Range Line Lake	14	SEEPAGE	None	1876000
	Rock Lake	33	SEEPAGE	Wilderness	2492800
	Spring Lake T43N R06W S32	11	SPRING POND	Trail	2420400
	Tank Lake T43N R06W S11	8	ACID BOG	Wilderness	2500900
	Trail Lake (Emerson No. 5)	4	SEEPAGE	None	2502100
	Twin Lake, North	53	SEEPAGE	Trail	2731800
	Twin Lake, South	19	SEEPAGE	Trail	2494400
	White Bass Lake	112	SEEPAGE	None	2430800
Orienta	Orienta Flowage	144	DRAINAGE	Boat Ramp	2872200
Pilsen	Honey Lake	10	SEEPAGE	Wilderness	2763800
	Lake River	14	SEEPAGE	None	2765700
	Louise Lake (Evelyn)	4	SPRING POND	None	2889300
	Mirror Lake T47N R07W S06	13	SEEPAGE	Wilderness	2768700
	Sawdust Lake	17	SEEPAGE	Boat Ramp	2773200
(also in Keystone)	Spider Lake T47N R07W S15	75	SEEPAGE	None	2774200
	Twin Lake, Northeast	8	SEEPAGE	Wilderness	2769900
	Twin Lake, Northwest	7	SEEPAGE	Wilderness	2770200
	Twin Lake, Southeast	14	SEEPAGE	None	2773400
Port Wing	Bibon Lake (Flag)	50	DRAINAGE	Boat Ramp	2879300
	Unnamed T50N R08W S20-16	20	DRAINAGE	Nav Water	2877400
Tripp	Bailey Lake	9	SEEPAGE	Wilderness	2754700
	Dechamps Creek Spring	1	SPRING POND	Wilderness	2873400
	Jackman Lake	12	SEEPAGE	Boat Ramp	2764700
	Sand Lake	5	SEEPAGE	Wilderness	2773100
	Silver Sack Lake	7	SEEPAGE	Boat Ramp	2773900
Washburn	Cabin Lake (Cable)	4	SEEPAGE	Wilderness	2757300
	Eko Lake	3	SEEPAGE	Trail	2761100
	Hoist Lake	8	SEEPAGE	Trail	2763600
	Horseshoe Lake T48R07W S13	16	SEEPAGE	Trail	2764000
	Long Lake T48N R05W S06	36	SEEPAGE	Trail	2767200
	Moose Lake	5	SEEPAGE	Wilderness	2769100
	Pine Lake T48N R07W S10	10	SEEPAGE	Boat Ramp	2771500
	Rib Lake	4	ACID BOG	Boat Ramp	2772300
	Twin Lake, East	22	SEEPAGE	Boat Ramp	2761000
	Twin Lake, West	16	SEEPAGE	Boat Ramp	2832200

Appendix D

Potential Priority Lakes/Access Sites of Bayfield County

Rank and presence on this list may change over time.

Ranking criteria was based on:

1. Acreage accessed
2. ORW & ERW designation
3. Significant use of landing
4. AIS Presence or nearby
5. Fisheries
6. Number of properties on shoreline
7. Number of resorts on shoreline

Lake Name	Township	Acreage	LAKE TYPE	Access
Namakagon Lake (Spring & Garden)	Namakagon	3,227	DRAINAGE	Boat Ramp
Lake Owen	Drummond	1,323	DRAINAGE	Boat Ramp
Eau Claire Lake, Upper	Barnes	996	DRAINAGE	Boat Ramp
Eau Claire Lake, Middle	Barnes	902	DRAINAGE	Boat Ramp
Eau Claire Lake, Lower	Barnes	802	DRAINAGE	Boat Ramp
Pike Chain of Lakes:				
Twin Bear Lake	Iron River	172	SEEPAGE	Boat Ramp
Hart Lake	Iron River	259	SEEPAGE	Nav Water
Millicent Lake	Iron River	183	DRAINAGE	Nav Water
Eagle Lake	Delta	170	DRAINAGE	Nav Water
Buskey Bay	Iron River	100	SEEPAGE	Boat Ramp
City of Bayfield Landing	City of Bayfield	Lk Superior		Boat Ramp
Washburn Marina	City of Washburn	Lk Superior		Boat Ramp
Thompson's West End Park	City of Washburn	Lk Superior		Boat Ramp
Long Lake T47N R08W S02	Iron River	263	SEEPAGE	Boat Ramp
Tomahawk Lake	Barnes	134	SEEPAGE	Boat Ramp
Sand Bar Lake	Barnes	118	SEEPAGE	Nav Water
Siskiwit Lake*	Bell	330	DRAINAGE	Boat Ramp
Delta Lake	Delta	180	DRAINAGE	Boat Ramp
Robinson Lake	Barnes	91	DRAINAGE	Boat Ramp
Chippewa Lake*	Namakagon	274	DRAINAGE	Boat Ramp
Star Lake*	Drummond	234	DRAINAGE	Boat Ramp
Pigeon Lake*	Drummond	213	SEEPAGE	Boat Ramp
Atkins Lake*	Grand View	176	DRAINAGE	Boat Ramp
Cable Lake	Cable	166	DRAINAGE	Boat Ramp
Diamond Lake	Grand View	341	DRAINAGE	Boat Ramp
Bony Lake	Barnes	191	DRAINAGE	Nav Water
Tahkodah Lake (East)	Drummond	152	SEEPAGE	Boat Ramp
Orienta Flowage*	Orienta	144	DRAINAGE	Boat Ramp
Cranberry Lake				
T44N R09W S30	Barnes	131	DRAINAGE	Nav Water
Birch Lake T44N R09W S04*	Barnes	129	DRAINAGE	Nav Water
Jackson Lake	Grand View	142	DRAINAGE	Nav Water
Bark Bay Slough	Clover	116	DRAINAGE	Boat Ramp
Crystal Lake				
T44N R06W S32	Grand View	111	SEEPAGE	Boat Ramp
Half Moon (Millpond)				
T47N R08W S17	Iron River	106	SEEPAGE	Boat Ramp

* lakes with little to no lake group activity

Appendix E

Large Lakes with Limited access - AIS Presence Unknown

Lake Name	Township	Acreage	Access
Iron Lake	Hughes	249	Wilderness
Mud Lake T44N R07W S26	Drummond	181	Wilderness
Buffalo Lake	Namakagon	179	None
Ghost Lake	Namakagon	132	Wilderness
Spider Lake T47N R08W S17	Iron River	124	None
Basswood Lake	Delta	119	Trail
White Bass Lake	Namakagon	112	None
Deep Lake T47N R09W S14	Hughes	103	None
Dells Lake	Namakagon	103	None
Drummond	Drummond	99	Boat Ramp
Crystal Lake T47N R09W S15	Hughes	94	None
Crooked Lake	Iron River	93	None
Kern Lake	Delta	91	None
Swett Lake (Sweet)	Barnes	88	Trail
Hammil Lake (Hammel)	Drummond	85	None

Appendix F

Known Priority AIS by Lake/Area in Bayfield County - 2016

AIS	TOWN	LAKE / AREA
Eurasian Water Milfoil	Barnes	Sand Bar & Tomahawk Lakes
	Iron River	Buskey Bay, Eagle, Flynn, Hart ,Millicent, & Twin Bear Lakes
	City of Washburn	Washburn Harbor, Chequamegon Bay
	Namakagon	Lake Namakagon at Lakewoods Resort, also near Paines Island (hybrid milfoil)
Curly-leaf Pondweed	Iron River	Hart Lake, the Iron River
	Barnes	Upper Eau Claire Lake, Middle Eau Claire Lake
Purple Loosestrife	Barksdale, Bayfield, Bayview, Russell	Bayfield Peninsula eastern shoreline, Hwy 13
	Barnes	Cranberry Lake, Lower Eau Claire Lake
	Cable	Cable Lake, Wiley Lake
	Keystone	ROW of Cty Hwy F near Benoit bridge
	Iron River	Buskey Bay, Millicent & Pike Lakes,
	Grand View	Bibon Swamp along Hwy. 63
	Namakagon	Twin Lakes, Lake Namakagon (Junek's Point, Lakewoods Resort)
Japanese & Giant Knotweeds	Bayfield, City of Bayfield	Near town garage on Hwy J, abundant throughout City of Bayfield and C&W Trucking
	Bell	Populations near County Rd. C and in Cornucopia
	Clover	Populations along Bark Point Rd. and in Herbster
	City of Washburn, Washburn	Numerous populations in the City of Washburn, and along Hwy 13
	Eileen	Large patch in ROW spreading down to a creek near intersection of Woodland Rd. & Walczak Rd.

	Iron River	Populations scattered in and near Town of Iron River, Pike Chain of Lakes,
Phragmites (?)*	Bayview	Sioux Beach
	Eileen, Grand View	isolated patches on Hwy 2 & 13, along Hwy 63, Bibon Swamp
Eurasian Ruffe	Bell, Clover, Port Wing, Russell	Numerous locations on the N and NE shoreline of Bayfield Peninsula, Lake Superior
	City of Washburn	Washburn Coal Dock (Lake Superior)
Rusty Crayfish	Barnes	Eau Claire Lakes (Upper, Middle, Lower)
	Delta /Iron River	Ruth & Pike Lakes, Pike Chain of Lakes

* question whether invasive European strain or native; however, species not historically in region. Possible that the wastewater treatment plants in Washburn, Bayfield, and Red Cliff may be contributing to its spread via seed by using non-native Phragmites for dewatering solids.

AIS Found in Regions Closest to Bayfield County

AIS	**LOCATION**
Curly-leaf Pondweed	Ashland Marina, Ashland Co.
Eurasian Water milfoil	Kreher Park Landing and Ashland Marina, Ashland Co.
Eurasian Ruffe	White River, south of Ashland, Ashland Co.
Faucet Snails	Elton Creek, Langlade Co.; Duluth-Superior Harbor, Douglas Co.
Round Goby	Duluth/Superior Harbor, Amnicon River, Douglas County (one individual)
Sea Lamprey	Bad River in Ashland Co.
Spiny Water flea	Gile Flowage, Iron Co.; Stormy Lake, Vilas Co.; Superior/Duluth Harbor, Lake Superior; reports near Madeline Island, Ashland Co.
Zebra Mussel	Amicon River, Douglas Co. (two individuals); Lake Metonga, Forest Co.; St. Croix River north of St. Croix Falls and Clear Lake, Polk Co.
Quagga Mussel	Superior Harbor and Krons Reef (near Madeline Island) Lake Superior

Other Aquatic Exotics in Bayfield County lakes or in the Region

EXOTIC	**LOCATION**
Alewife	Bayfield Peninsula Northwest, off shoreline, trawl data
Banded Mystery Snail	Diamond Lake, Millicent Lake, Middle Eau Claire Lake, Robinson Lake, Tahkodah Lake, West Twin Lake; Nelson Lake, Sawyer Co.
Chinese Mystery Snail	Buskey Bay, Delta Lake, Diamond Lake, Eagle Lake, Lake Owen, Millicent Lake, Namakagon Lake, Twin Bear Lake, Upper Eau Claire
Freshwater Jellyfish	Breakfast Lake, George Lake, Pigeon Lake, Spider Lake, Star Lake
New Zealand Mudsnail	Duluth-Superior Harbor, St. Louis Estuary
Rainbow Smelt	Diamond, Cisco, Sandbar and Tomahawk Lakes, and Lake Superior
Rusty Crayfish	Buskey Bay, Lake Millicent, Long Lake; Lower, Middle and Upper Eau Claire Lakes; Pike Lake, Ruth Lake
White Perch	Bayfield Peninsula Northwest, off shoreline, trawl data
3-Spine Stickleback	Mouth of Flag River at Port Wing, Mouth of Iron River west of Port Wing

Appendix G

List of Target Audiences & List of Potential Assistance Groups

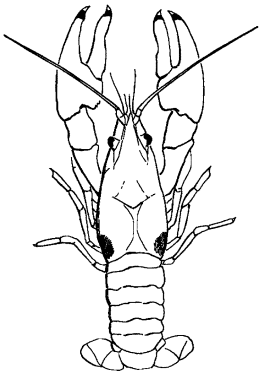
Target Audience	Potential Assistance Groups
Bait Dealers	American Fisheries Society
Campground Managers	Americorps/Vista Volunteers
Chambers of Commerce	Bayfield Regional Conservancy
County Departments	Boy & Girl Scouts
Educators	Business Match-Power Companies
Guides	Civic Groups
Lakeshore Property Owners	Church Groups
Local Governments	Federal Agencies
Resort Owners	Great Lakes Indian Fish & Wildlife Commission
Realtors	Individual Lake Associations
Red Cliff Tribal Members	Lake Associations
Students	Master Gardeners/Master Naturalists
Tourists	Non-profit Conservation Groups
Watercraft Operators	Northland College
Watercraft Retailers/Rental Shops	Northwoods Cooperative Weed Management Area
	Trout Unlimited
	4-H Clubs
	Wisconsin Department of Agriculture, Trade, and Consumer Protection
	Wisconsin Department of Natural Resources

Appendix H

Animals

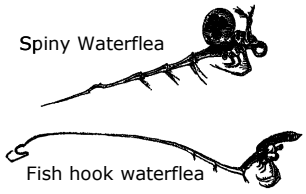
Crustaceans

Rusty Crayfish *(Orconectes rusticus)*



Rusty crayfish (RC) are native to streams in the Ohio River Basin states of Ohio, Kentucky, Illinois, Indiana and Tennessee. Anglers who used them as live bait were likely the primary pathway for introduction into Wisconsin waters. Bait and biological supply companies still sell them. It is illegal to possess both live crayfish and angling equipment simultaneously on any inland Wisconsin water (except certain areas of the Mississippi River). It is also illegal to release crayfish into a water of the state without a permit. **DESCRIPTION:** They are from 3 – 5 inches long (excluding claws) and have larger claws than native crayfish. The claws are usually smoother than other crayfish without the wart-like white bumps. The claw tips have black bands and when closed have an oval gap, not a thin slit. They have rusty-colored spots on the sides of their body. ***Identifying Characteristics***: *Large, smooth claws with black tips and dark rusty red spots on either side of the carapace.* **LIFE HISTORY:** Rusty crayfish inhabit lakes, ponds, and streams. They prefer areas that offer rocks, logs, or other debris as cover and can live on most substrates. Rusty crayfish inhabit slow- and fast-flowing water areas of streams but they need suitable water quality year-round. RC are aggressive opportunistic feeders feeding on a variety of aquatic plants, benthic invertebrates (like aquatic worms, snails, leeches, clams, aquatic insects, and crustaceans like side-swimmers and water fleas), detritus, fish eggs, and small fish. They can eat up to four times the amount native crayfish do. Although crayfish are generally prey for fish, RC will defend themselves from a predator, facing their attacker with claws open and swinging. Rusty crayfish are prolific, and females can lay 80-575 eggs per season.
IMPACT: Rusty crayfish avoids fish predation more than native crayfish, so they can quickly displace native crayfish. Also, RC prey directly on fish eggs, small fish, and insects, and they have the habit of clipping submersed vegetation near ground level to feed on the lower stem or the roots. Over time, this clipping will clear an area of most plant life, removing the habitat that is so essential for fish spawning, cover and food. Unfortunately, this clipping also opens up areas for other invasive species to colonize.

Spiny Water Flea *(Bythotrephes cederstroem)*
Fishhook Water Flea (*Cercopagis pengo)*



Waterflea mass on fishing line

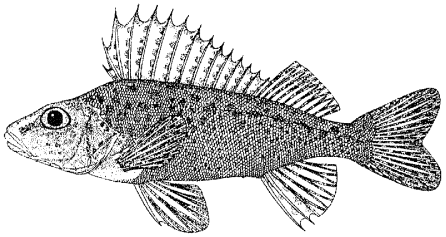
Both of these water fleas entered the Great Lakes in ship ballast water from Europe. Spiny water fleas (SWF) arrived in the 1980s, followed in the 1990s by the fishhook water flea (FWS). The DNR officially recorded spiny water fleas in the Gile Flowage (Iron County) in 2003 and Stormy Lake (Vilas County) in 2007. They are now in several inland Wisconsin lakes. Unfortunately, there is currently no effective strategy available to control spiny water fleas upon introduction to a lake.

DESCRIPTION: Only about ¼ to ½ inch in length, individual water fleas may go unnoticed. However, both species tend to gather in masses on fishing lines and downrigger cables, so anglers may be the first to discover a new infestation.

Identifying Characteristics: *Most notable are a long pointed tail with spines or a long tail with a "hook" at the end. They tend to appear as gooey whitish brown gobs on fishing lines. Their very long tails are something that native water fleas do not exhibit.* **LIFE HISTORY:** The spiny and fishhook water fleas produce rapidly through parthenogenesis. This means that no males are required for reproduction and populations can explode. Fishing, boating, and other water recreational equipment (including anchors), can transport spiny water fleas and their eggs to new water bodies. Spiny water fleas are a cold-water species, meaning that high surface water temperatures are lethal to them. Their resting eggs can survive long after the adults are dead though, even under extreme environmental conditions. **IMPACT**: Spiny and fishhook water fleas are predators—they eat smaller zooplankton (planktonic animals) including Daphnia. This puts them in direct competition with juvenile fish for food. Young fish have trouble eating these water fleas due to their long, spiny tails.

Fish

Eurasian Ruffe *(Gymnocephalus cernuus)*



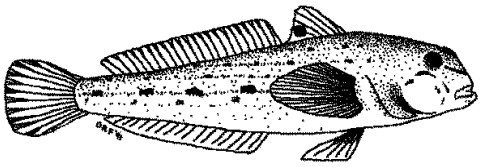
Native to Eurasia, the ruffe ("rough") entered the Great Lakes in the ballast water of ocean-going vessels around 1985. The ruffe is a member of the perch family that may be confused with young native fish such as yellow perch and walleye.

DESCRIPTION: The ruffe is olive-brown to golden-brown on back, and paler on the sides with yellowish undersides. Ruffe average 4-6 inches in length and have a large spiny dorsal fin with rows of black spots between the spines. The gill cover has many sharp spines, as well as some on the pelvic and anal fins. ***Identifying Characteristics:*** *Spiny and slimy, glassy eyes like walleyes. The spiny and soft-ray parts of the dorsal fin are fused. Lack of scales on their heads also helps to separate them from native perch species.* **LIFE HISTORY:** The ruffe is an aggressive fish and can eat a variety of foods. It competes directly with native fish for food and habitat and populations have the potential to increase rapidly. The average female can produce 130,000 to 200,000 eggs per season. Ruffe are more tolerant of poor water conditions and have several anatomical features. Examples include a well-developed sensory organ that detects vibrations given off by both predators and prey, giving them an advantage over native fishes. **IMPACTS:** Native fish populations—especially yellow perch, emerald and spottail shiners, trout-perch, and brown bullhead—have declined in locations where ruffe have become established.

Rainbow Smelt *(Osmerus mordax)*

Rainbow smelt escaped into the Great Lakes from an inland lake in Michigan. **DESCRIPTION:** Rainbow smelt are slender fish typically 6-8" long, with obvious teeth and a small fleshy fin on top of their body near the tail. Shimmers colorfully in water but fades out of water**. LIFE HISTORY:** Rainbow smelt can be anadromous, moving from saltwater to freshwater streams to spawn, or they can live a freshwater existence. Rainbow smelt typically initiate spawning shortly after ice-out. Females sized 185 to 224 mm (7.3 – 8.8 in) in length can release from 21,000 – 41,000 eggs each (Becker 1983). Fry are very slender and nearly transparent. **IMPACTS**: Negative impacts of smelt can arise from predation on larva of other species, competition with other species for food resources, changes in zooplankton size structure, cascading trophic changes that lead to greater phytoplankton biomass, biomagnification of contaminants, and possibly thiamine deficiency in piscivores feeding on smelt.

Round Goby *(Neogobius melanostomus)*



Round Goby originated from the Caspian Sea in Europe and made itself conspicuous in Lake St. Clair in 1990, presumably introduced via ballast water from transoceanic vessels. The round goby has spread to all of the Great Lakes and many rivers, including the Mississippi River watershed. In 2015, anglers in WI caught this fish in the Menasha lock, the last physical barrier between established populations in Lake Michigan and the goby-free Lake Winnebago system.

DESCRIPTION: The round goby is a bottom-dwelling fish with a large head, usually 4-6 inches long but can grow to 10 inches in length. Its body is mostly slate gray with mottled brown spots. They have raised eyes like a frog. They have large pectoral fins and an unusual single, fused pelvic fin that is shaped like a suction cup. The anterior dorsal fin has a black spot at its base. ***Identifying Characteristics:*** *sculpin-like but pelvic fins distinctly fused together in a scallop shape (native sculpins have two separate pelvic fins).*

LIFE HISTORY: Gobies can spread by swimming, introductions to new areas and through population expansion. Gobies can reproduce up to six times a summer allowing their populations to expand rapidly. They are fierce competitors for food and can forage in total darkness. Gobies are also voracious egg predators. They get so numerous that even smallmouth bass that guard their eggs cannot successfully defend their nests from the onslaught of hungry gobies. **IMPACTS:** The round goby takes over prime living and spawning sites traditionally used by native species, like sculpins and log perch. Smallmouth bass pulled off their nests by anglers in the spring may find few if any eggs remaining when they return to their nests upon release. Gobies also consume the eggs of fish that broadcast their eggs or build nests in the cobble substrate. These fish might include walleye, sunfish, lake trout and other salmonids. They are bait stealers, often being caught in the process and then can be inadvertently spread by anglers if used as bait.

Sea Lamprey *(Petromyzon marinus)*

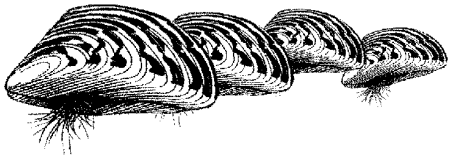
Sea lampreys are members of an ancient taxonomic class of "jawless fishes" that were around before the time of the dinosaurs. They are eel-like fish native to the coastal regions of both sides of the Atlantic Ocean. Some sea lampreys have always inhabited Lake Ontario and the St. Lawrence River, which are open to the Atlantic Ocean. In 1921, lampreys appeared in Lake Erie for the first time arriving via the Welland Canal. From there, they rapidly colonized all of the upper Great Lakes, with especially large infestations developing in Lakes Michigan and Huron. **DESCRIPTION:** They are from 12 to 20 inches in length but can reach 36 inches long. They have dark brown to black backs and light yellow to pale brown bellies. They have a feathery fin from their midsection down and under the tail. Their mouth is circular with circular rows of teeth and they have large reddish eyes. **LIFE HISTORY:** The sea lamprey is an aggressive parasite equipped with a tooth-filled mouth that flares open like a suction cup. When attacking, the lamprey fastens onto its prey with its teeth and rasps out a hole with its rough tongue. An anticoagulant in the lamprey's saliva keeps the wound open for hours or weeks until the lamprey is satiated or the host fish dies. In their natural habitat, sea lamprey—like salmon and alewives—are ocean fish that spawn in fresh water. **IMPACTS**: Large fish attacked by lamprey will most likely survive with a circular scar on their side. Small fish may die immediately from the attack or will later die from an infection caused by the wound. One sea lamprey can upset an ecosystem and food chain by eating an estimated 40 pounds of fish or more in its lifetime. Because of the lower numbers of large predatory fish, small fish, like the alewife (a non-native), were able to increase in number. Sea lamprey contributed greatly to the decline of whitefish and lake trout in the Great Lakes. Since 1956, the governments of the United States and Canada working jointly through the Great Lakes Fishery Commission have implemented a successful, but expensive sea lamprey control program.

Three-spine Stickleback (*Gasterosteus aculeatus*)

Native to the Cape Fear estuary up to Baffin Bay, and from the west coast of Alaska south to southern California, this fish has expanded its range to include the entire Great Lakes system, though it is native in Lake Ontario. It has invaded inland waterbodies in at least nine states, according to the USGS site. **DESCRIPTION**: Has 2-4 (usually 3) dorsal spines, a torpedo-shaped body,

Mussels

Zebra Mussel *(Dreissena polymorpha)*
Quagga Mussel *(Dreissena bugensis)*



Zebra Mussels (ZM) arrived in the Great Lakes in 1985 or 1986 and began spreading across the country. Ships that traveled from fresh-water Eurasian ports to the Great Lakes likely brought them to North America as larvae in contaminated ballast water. Discovered on the Wisconsin side of Lake Michigan in 1990, ZM are now in 187 inland lakes and many miles of streams and rivers in Wisconsin. Populations of zebra mussels have increased to over several thousand per square meter in some portions of the Mississippi River. Quagga mussels (QM) are native to the Caspian Sea drainage in Eurasia, and like zebra mussels, they most likely arrived as stowaways in the ballast water of ocean-going ships. Water monitors discovered them in the Great Lakes region in September 1989, yet scientists did not identify them as a distinct species until 1991. **DESCRIPTION: Zebra Mussel:** ZM look like small clams with a yellowish or brownish D-shaped shell, usually with alternating dark- and light-colored stripes. They are tiny (1/8-inch to 2-inches) bottom-dwelling mussels. ZM usually grow in clusters containing many individuals. They are generally found in shallow (6-30 feet deep), algae-rich water and feed only during the summer months.

Quagga mussel and zebra mussel comparison
©Myriah M. Richerson

DESCRIPTION: Quagga Mussel: A Quagga Mussel (QM) and ZM look similar, sporting narrow or blotchy black stripes on light tan to almost white shells. The QM shell has a rounded hinge, though. The shell is fan-shaped, and the ventral side (bottom side where the 2 shells connect) of the QM is convex, which makes it topple over when it is placed on a flat surface. The ZM will remain upright when placed in this position. QM thrives on sandy or rocky bottoms up to depths of 500 feet. They feed year round. ZM and QM are the only freshwater mollusks that can firmly attach themselves to solid objects, though QM does not need to attach to a solid object to survive. **LIFE HISTORY:** ZM and QM usually reach reproductive maturity by the end of their first year. Reproduction occurs when adults release sperm and eggs into the water. A fertilized egg results in a free-swimming, planktonic larva called a 'veliger.' This veliger remains suspended in the water column for one to five weeks. It then begins to sink, eventually attaching to a stable surface (e.g., rocks, dock pilings, aquatic plants, water intakes, boat hulls) so it can live, grow and reproduce. They attach to these surfaces using adhesive structures called byssal threads. Mussels feed by drawing water into their bodies and filtering out most of the suspended microscopic plants, animals and debris for food. This process can lead to increased water clarity yet a depleted food supply for other aquatic organisms, including fish. Increased water clarity also contributes to invasive plant growth and spread. ZM attach to the shells of native mussels in great masses, effectively smothering them. QM can live in waters ranging from warm and shallow, to deep and cold. They are also able to tolerate somewhat salty water. In Wisconsin, the quagga now exists in Lakes Michigan and Superior. Because they prefer silt- and sand-bottomed lakes, quagga mussels may be able to invade inland lakes successfully, including some lakes that are not suitable for zebra mussels. **IMPACTS:** These animals congregate on and clog water intake and distribution pipes, cause water-cooled boat motors to burn up and their shells cut feet when stepped on. They contribute to blue-green algae blooms and waterfowl die-offs because of an increase in botulism, increase water clarity that allows invasive plants to grow deeper, and destroy the base of the food web by filtering out plankton.

Snails

Banded Mystery Snail *(Viviparus georgianus)*

Native to parts of the US, it spread to the Great Lakes through the Erie Canal and Mohawk River. **DESCRIPTION:** Up to 1 ¾ inches long, olive-green shell with 4-5 whorls with distinct sutures; 4 reddish bands circle the shell (sometimes only visible from the inside); along the lip of the shell there are ridges and "hairs" with hooked ends. **LIFE HISTORY:** These snails are dioecious (it has two distinct sexes), reproduce more than once in a lifetime, and lay eggs singly in albumen-filled capsules. Females can brood more than one batch of young at a time, and they live between 18-48 months. Banded mystery snails can be facultative or even obligate filter-feeding detritvores. This species grazes on diatom clusters found on silt and mud substrates, but it may also require the ingestion of some grit to break down algae. **IMPACTS**: Snails can form dense aggregations. This species can cause mortality of largemouth bass embryos when they invade nests.

Chinese Mystery Snail *(Cipangopaludina chinensis malleata)*

Chinese food markets in San Francisco sold this species starting in 1892. An aquarium dump into the Niagara River between 1931 and 1942 is probable, and someone collected it as early as 1915 in Massachusetts**. DESCRIPTION:** The Chinese mystery snail has small shallow depressions above the shell opening and rows of fine, short stiff hairs parallel to the whorl of the shell (may wear off with age and abrasion). Up to 2 ¼ inches long; pale brown to olive-green shell, has 6-7 tightly wound whorls without banding and very fine growth rings. **LIFE HISTORY:** Chinese mystery snails feed non-selectively on organic and inorganic bottom material as well as benthic and epiphytic algae. It prefers slow-moving freshwater rivers, streams, and lakes with soft, muddy or silty bottoms. This species is ovoviviparous (and live 3-5 years. Female fecundity is usually greater than 169 young in a life time. **IMPACTS**: Snails can form dense aggregations. In Asia, this species can transmit human intestinal flukes; however, the United States has not documented any cases. It also is a carrier of trematode parasites found in native mussels.

Faucet Snail *(Bithynia tentaculata)*

Faucet snails arrived in the Great Lakes and people first noticed them in the 1870s. They were likely spread with solid ballast used in large timber transport ships or by contaminated vegetation used in packing crates. Faucet snails quickly spread to inland waters, often reaching high densities and outcompeting native snails. **DESCRIPTION:** The faucet snail has a shiny pale brown shell, oval in shape, with a relatively large and rounded spire consisting of 5–6 somewhat flattened whorls, no umbilicus, and a very thick lip. The aperture is less than half the height of the shell. Adult faucet snails possess a white, calcareous, teardrop to oval-shaped operculum with distinct concentric rings. The operculum of juveniles, however, is spirally marked. The operculum is always located very close to the aperture of the shell. The animal itself has pointed, long tentacles and a simple foot with the right cervical lobe acting as a channel for water. **LIFE HISTORY:** This species functions as both a scraper and a collector-filterer, grazing on algae on the substrate, as well as using its gills to filter suspended algae from the water column. When filter feeding, the snails suck in and condense algae, and then eat it by passing pellet-like packages out between the right tentacle and exhalant siphon. Faucet snails feed

selectively on food items. Faucet snails are dioecious (has two sexes) and lays its eggs on rocks, wood and shells in organized aggregates arranged in double rows, in clumps of 1–77. Egg laying occurs from May to July when water temperature is 20ºC or higher, and sometimes a second time in October and November by females born early in the year. The density of eggs on the substrate can sometimes reach 155 clumps/m^2. Growth usually does not occur from September to May. The lifespan varies regionally and can be anywhere from 17 – 39 months **IMPACTS**: Faucet snails threaten waterfowl, food webs, and may clog water intakes. They host three intestinal flukes that can kill scaup, coots, and other waterfowl that consume them.

New Zealand Mud Snail *(Potamopyrgus antipodarum)*

In the fall of 2013, benthic macroinvertebrate samples collected from Black Earth Creek in western Dane County in 2011 and 2012 revealed the presence of New Zealand Mud Snail (NZM). The only other populations in the region are in Lake Superior's Duluth-Superior Harbor and Lake Michigan's Waukegan Harbor. **DESCRIPTION:** The NZM has a dextral (right-handed coiling), elongated shell with 7-8 whorls (twirls) separated by deep grooves. The shell color can range from gray to light or dark brown. In the Great Lakes, the NZM typically measures 4 to 6 mm in length, but grows to 12 mm regularly in its native range. **LIFE HISTORY:** The NZM is a small, operculate (trapdoor) snail and it gives birth to live young. NZM is a primary consumer that grazes on algae and is native to New Zealand. It has a wide range of environmental tolerances and exists in nearly every freshwater habitat in New Zealand. In their native habitat, they reproduce sexually: however, they can reproduce asexually, and all introduced populations are clonal. This means that just one snail can start a new population. Its operculum allows it to survive in undesirable environments for extended periods, too. **IMPACTS**: Initial invasion pathways to the United States may have been ballast water or in water of live gamefish shipped from infested waters. Secondary pathways include but are not limited to waders and other fishing gear, watercraft, commercial construction equipment, and fish stocking equipment. It is unknown how the mud snail will affect the Black Earth Creek fishery, as this is the first inland invasion not only in Wisconsin, but also in the Midwest. Research from other invasion sites, however, suggests that Wisconsin streams could realize negative impacts. The NZMs will likely compete directly with native grazers and could reduce the abundance of this important food source. Research from the western U.S. also suggests that some fish species avoid mud snails while other fish will readily eat them. However, energetic studies show that NZMs can pass through fish stomachs undigested and therefore may offer little to no energy when compared to other common food items. NZMs have predators in their native range, but there is no evidence that predators do or could control populations.

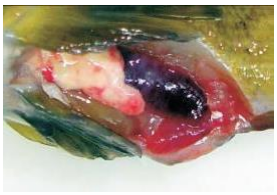
Pathogens

Viral Hemorrhagic Septicemia (VHS)

In spring 2007, anglers and scientists reported a virus in the Lake Winnebago Chain that is responsible for large fish kills in some of the Great Lakes and inland lakes of New York. Viral Hemorrhagic Septicemia (VHS), a name based on the internal hemorrhaging the virus causes, is present in Lakes Michigan and Superior, the Lake Winnebago system and a few lakes in Door County. This invasion adds another dimension to the protection of our water resources and the organisms that live within them. This viral invader does not simply upset a balance over time; it can directly eliminate numerous individuals from a particular population that may then take years to recover. Presently, this virus can affect 28 species of fish, including 19 species of sport fish. **PATHOLOGY**: The virus infects fish via their gills and after two days, the fish expels VHS via urine, ovarian fluid and milt. Transmission also occurs when a fish eats an infected fish. The virus can remain viable in the water for 14 days without a host. The virus infects internal organs and the cells that line blood vessels causing severe hemorrhaging. Clinical signs include pop-eye, hemorrhaging on the skin and within the muscle tissue, and swollen internal organs. The usual cause of death is extreme blood loss. Most infected fish die at 37-41 °F but rarely die above 59 °F. There is no cure. We know little about the tolerance levels of this virus because it has mutated from the strain originally discovered infecting trout farms in Nordic countries in the 1930's. Transfer to another water body is most likely through transfer of an infected fish, or by the transfer of large amounts of contaminated water *(19 Dec 07 letter to anglers from Mike Stagg, Director, DNR Bureau of Fisheries Management)*. **IMPACTS:** This virus can potentially cause massive fish population die-offs and severely affect the billion-dollar fisheries industry.

Symptoms of VHS:

external hemorrhaging
internal hemorrhaging
swollen eyes
pale organs



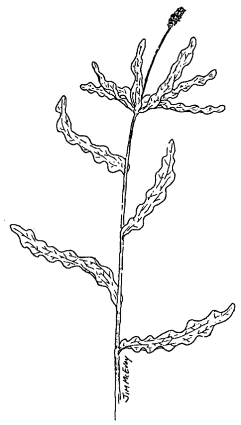
Plants

Common Reed *(Phragmites australis)*

Invasive European strains of common reed (more commonly called Phragmites) probably were introduced during the 1800s in ballast water. There is a native strain and an invasive strain of Phragmites in Wisconsin (and Bayfield County). Previously unknown to be viable by seed, populations of this plant have been appearing near wasterwater treatment plants where Phragmites is used to de-water sludge. **DESCRIPTION:** Phragmites is a perennial wetland grass that grows 3-20 feet tall with dull, rigid, hollow stems. The leaves are smooth and narrow 6- 24" long, 0.4-2.4" wide and blue-green in color. Leaf sheaths tightly clasp the stem, are difficult to remove, and stay on through winter. Long hairs are present at the junction of leaf and sheath. The flowers are bushy, light brown to purple plumes that are composed of spikelets that bloom July-September. Plumes are 7.5-15" long and often resemble feather dusters. Fruits and seeds are small and tan with many white hairs. Roots are stout oval rhizomes, growing to depths of 6 feet and reaching 10 feet horizontally.

Identifying Characteristics: *Phragmites stems have ridges, retain their leaves and leaf sheaths throughout winter and they have no black spots caused by a native fungus. Seed heads have a fluffy, pillow-like appearance. You can see the first three throughout the year*.

LIFE HISTORY: Phragmites grows taller than most plants and its dead stalks often remain standing over the winter. Phragmites can spread through root fragments, long runners above ground, and sometimes wind-blown seeds or cut stem fragments. **IMPACTS**: Phragmites invades moist habitats including lakeshores, riverbanks and roadways. It is common in disturbed areas and can tolerate brackish waters, dry conditions and alkaline to acidic conditions. This plant can quickly establish itself by using extensive rhizomes to take over underground. These rhizomes store energy so the plant can recover from cutting, burning or grazing. Phragmites alters hydrology and wildlife habitat, increases fire potential, and shades out native species.



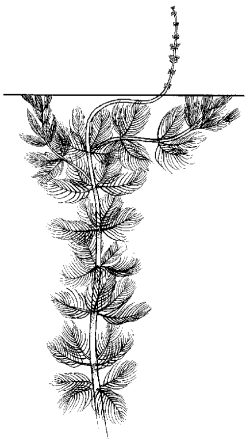
Curly-leaf Pondweed *(Potamogeton crispus)*

Curly-leaf pondweed (CLP) is an invasive aquatic perennial that is native to Eurasia, Africa, and Australia. Humans accidentally introduced curly-leaf pondweed to United States waters in the mid-1880s. **DESCRIPTION:** A submersed plant, it can grow up to 15 feet depths. The leaves are alternate along the stem, stiff, reddish-green, oblong, and about 3 inches long, with distinct wavy edges (crinkled) and fine teeth. A dense terminal spike on a 1-2 inch stalk reaches above the water surface in spring to reveal its flowers. This plant produces vegetative buds that resemble small brown pinecones along the stem by early summer. ***Identifying Characteristics****: Noticeably toothed leaves with hot pink leaf veins, no more than five veins running parallel to the leaf length, turions (buds), above –surface flowering stalk in spring.*

LIFE HISTORY: CLP spreads through turions and rhizomes (root-like structures in the sediment that spread out from one plant to produce a new plant). These plants can also reproduce by seed, but this plays a relatively small role compared to vegetative reproduction. New plants form under the ice in winter, allowing CLP to be one of the first plants to emerge in the spring. It becomes invasive in some areas because of its tolerance for low light and low water temperatures. These tolerances allow it to get a head start in spring and out-compete native plants. In mid-summer when most aquatic plants are growing, CLP is dying off, dropping its turions on the lakebed.

IMPACTS: Mid-summer plant die-offs may result in a loss of dissolved oxygen, a critical component for most aquatic life, particularly fish and insect larvae. Furthermore, the decaying plants can increase nutrients (i.e., "fertilize" the water) which contribute to algae blooms, as well as create unpleasant stinking messes on beaches. CLP can also form surface mats that interfere with aquatic recreation.

Eurasian Water Milfoil *(Myriophyllum spicatum)*



Eurasian water milfoil (EWM) is a submersed aquatic plant native to Europe, Asia, and northern Africa. It is the only non-native milfoil in Wisconsin. It arrived in the United States in the 1940s. **DESCRIPTION:** Like the native milfoils, the Eurasian variety has slender stems whorled with feathery leaves. Stems of EWM are long, slender, branching, hairless, and become leafless toward the base. Stems grow to the water surface, usually extending 3 to 10 feet, but as much as 33 feet in length and frequently forming dense mats. The leaves are featherlike, occur in whorls of four, are typically uniform in diameter and about ½ inch in length. EWM has 12-21 pairs of leaflets per leaf, while northern water milfoil typically has 7-11. These two species can hybridize. EWM also produces tiny flowers that reach 2-4 inches above the water surface in autumn. ***Identifying Characteristics***: *Leaves are very feathery in appearance, are soft, and fine when felt underwater. When pulled from the water, the leaves lay flat against the stem. It does not have turions and turion leaves like northern water milfoil.*

LIFE HISTORY: As an opportunistic species, EWM is adapted for rapid growth in early spring. Stolons, lower stems, and roots persist over winter and store carbohydrates that allow the plant to get a jump-start over its native cousins. By early summer, EWM is already forming a dense canopy that shades out native aquatic plants. Its abilities to spread rapidly and effectively block out sunlight often results in monotypic stands.

Unlike many other plants, EWM does not rely heavily on seeds for reproduction, as they germinate poorly in natural conditions. This plant instead reproduces vegetatively and will easily fragment on its own during late summer; however, it can spread just as easily if humans break it apart earlier in the season. Water currents or boaters may inadvertently pick up these fragments and carry them to new locations. The floating fragments can sprout adventitious roots and will eventually sink to the lakebed where they will take root and begin the cycle anew.

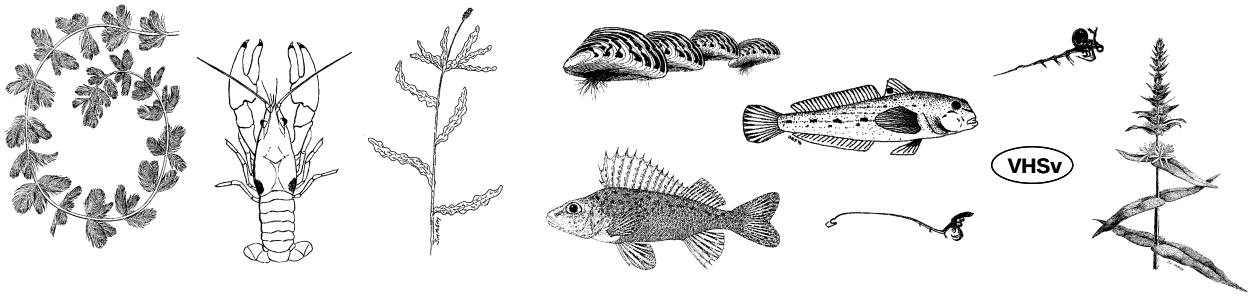
IMPACT: Boats, bilges, bait buckets, duck decoys, live wells, motors, SCUBA and snorkel equipment, trailers and a whole host of other things readily disperse EWM. It can stay alive for weeks if kept moist. Monoculture stands of EWM provide only a single habitat and threaten the integrity of aquatic communities in a number of ways. For example, dense stands disrupt predator-prey relationships by fencing out larger fish and reduce the number of nutrient-rich native plants available for waterfowl. Dense stands of EWM also inhibit recreational uses like swimming, boating, and fishing. Cycling of nutrients from sediments to the water column by EWM may lead to deteriorating water quality and algae blooms of infested lakes. Long-term management of dense EWM populations is expensive and can be controversial where chemical treatments are used.

Giant and Japanese Knotweed *(Polygonum sachalinense and Polygonum cuspidatum)*

Giant and Japanese knotweed are large bamboo-like plants native to Asia which are easily spread by root fragments. Giant knotweed hot spots in Bayfield County include Bayfield, Washburn, and the Cornucopia/Herbster area. Japanese knotweed is prevalent in Iron River. **DESCRIPTION:** Giant and Japanese knotweed are herbaceous perennials that can reach 9 feet tall and form large vegetative colonies. Semi-woody stems are erect and hollow with distinct raised nodes. Leaves are alternate and simple, narrowing to a pointed tip. Japanese knotweed leaves are 4-6" long and have a flat base. Giant knotweed leaves are 6-14" long and have a heart-shaped base. The flowers are upright racemes of numerous small, greenish white flowers. Giant knotweed blooms have both male and female parts in the same flower while Japanese knotweed bears only male or female flowers on a given plant. Three-angled fruits are small (0.2"), shiny, black, and dry. A winged calyx encloses the fruit, making them buoyant. Robust rhizomes grow up to 6 feet deep and create an impenetrable mat. ***Identifying Characteristics***: *Hollow, bamboo-like stems that gush water when broken; tiny white flowers in large clusters from mid-August to the end of September; semi-woody stalks left behind when above ground part dies back.* **LIFE HISTORY:** Knotweed is a fast grower, flowers in late summer, and the stems turn brown and persist in the winter. It evolved to grow on the side of volcanoes, so its roots are extremely strong. **IMPACT**: New infestations of knotweed often occur when transportation of contaminated soil or flooding spreads rhizome fragments. Knotweed poses a significant threat to riparian areas where it prevents streamside tree regeneration, and increases soil erosion. Root fragments smaller than a paperclip (by weight, not size) can re-sprout, producing new infestations. Knotweed disrupts nutrient cycling in forested riparian areas, and these plants release allelopathic compounds (compounds toxic to surrounding vegetation) contained in the roots. The roots are also capable of breaking up asphalt and cracking foundations. The Minocqua Chamber of Commerce is a regional example of this.

Purple Loosestrife *(Lythrum salicaria)*

People introduced Purple Loosestrife (PL) as a garden perennial from Europe during the 1800s. Some horticulturists still promote it for its beauty as a landscape plant, and by beekeepers for its nectar-producing capability. **DESCRIPTION:** PL is an upright, semi-woody perennial herb 3-7 feet tall with a dense bushy growth of 1-50 stems that die back each fall. Leaves are lance-shaped, smooth edged, 1-4 inches and attached directly (without stalks) to four- to six-sided stems. Four-sided stems typically have opposite leaves, five–sided have leaves in a spiral arrangement, and six-sided have leaves in whorls. Foliage may be hairy. Its showy flowers vary from purple to magenta, have 5-6 petals, and numerous long spikes aggregate them. The flowers bloom from July to September. It has a large, woody taproot with fibrous rhizomes that form a dense underground mat. ***Identifying Characteristics***: *Hundreds of tightly bunched purple flowers on a long stalk, smooth-edged pointed leaves; and a square, hairless stem. All leaf arrangements can occur on a single plant.* **LIFE HISTORY:** PL has a wide tolerance of physical and chemical conditions. Its ability to reproduce prolifically by both seed dispersal and vegetative propagation have allowed for its reproductive success across North America. Optimum substrates for growth are moist soils of neutral to slightly acidic pH, but it can exist in a wide range of soil types. Purple loosestrife can spread by seed, root or stem segments and rhizomes. A single stalk can produce from 100,000 to 300,000 seeds per year resulting in an extensive seed bank. Germination is restricted to open, wet soils and requires high temperatures, but seeds remain viable in the soil for many years. Even seeds submerged in water can live for approximately 20 months. Most of the seeds fall near the parent plant, but water, animals, boats, and humans can transport the seeds long distances. Vegetative spread through local disturbance is also characteristic of loosestrife; clipped, trampled, or buried stems of established plants may produce shoots and roots. Plants may be quite large and several years old before they begin flowering. It is often very difficult to locate non-flowering plants. Monitor for new invasions at the beginning of the flowering period in mid-summer. **IMPACT**: Purple loosestrife displaces native wetland vegetation and degrades wildlife habitat. Rare plants are often the first species to disappear. Eventually, it can overrun wetlands, nearly eliminating the open water habitat. The plant can also be detrimental to recreation by choking waterways.



Note: The following sources provided information for these species profiles and pictures: Wisconsin and Minnesota DNRs, the Sea Grant programs of WI, MN and MI, Invasive Plant Association of Wisconsin, Wisconsin Wetlands Association, UW-Extension Lakes Program, Aquatic Plants of the Upper Midwest: A Photographic Field Guide to Our Underwater Forests, and the U.S. Geological Survey.